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# Cloud-based Data Lakes in Healthcare Challenges and Opportunities

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**Abstract**

**The swift digital revolution of healthcare has produced enormous amounts of data that require effective storage, handling, and analysis. Cloud-based data lakes have become a key technology to manage large-scale healthcare data sets, supporting interoperability, real-time analytics, and AI-informed decision-making. Cloud-based data lakes like AWS S3, Azure Data Lake, and Google BigQuery offer elastic storage, high-security platforms, and sophisticated computing power that allow data integration and accessibility. This article illustrates how cloud-based data lakes simplify healthcare data management, enable machine learning uses, and improve clinical decision support systems. It also illustrates key challenges like data privacy, regulatory compliance, and cyber-attacks that occur in healthcare data environments. The study evaluates the impact of cloud-native designs in improving healthcare efficiency, reducing operational costs, and optimizing patient outcomes. Cloud-based data lakes are the foundation for predictive analytics, tailored medicine, and interoperable data transfer across healthcare networks based on the application of AI and big data technologies. The paper highlights the transformative potential of cloud technologies in revolutionizing modern paradigms for healthcare data management.**

**Keywords: Cloud Data Lakes, Healthcare Data Management, AWS S3, Azure Data Lake, Google Bigquery, Interoperability, Real-Time Healthcare Data Analytics, AI-Based Decision-Making, Regulatory Compliance, Cybersecurity, Predictive Analytics, Personalized Medicine, Big Data Health, Clinical Decision Support**

## I. INTRODUCTION

Exponential expansion of health-related information has created an urgent demand for flexible and efficient data management solutions. Conventional database systems cannot handle the volume, speed, and variety of health data from electronic health records (EHRs), medical images, genomics, and real-time monitoring patient systems. Cloud-based data lakes are today the revolutionary solution with which healthcare organizations can store, process, and analyze humongous data sets of high interoperability, security, and real-time analytic capability [1] [3][5]. Cloud-based data lake platforms like Amazon Web Services (AWS) S3, Microsoft Azure Data Lake, and Google BigQuery offer a centralized repository of structured and unstructured healthcare information. These platforms enable effortless integration of data from various sources such that healthcare providers, researchers, and policymakers can obtain actionable insights through AI-powered analytics [2] [6] [9]. Data warehouses, which demand pre-defined schemas, are different from data lakes that allow raw data ingestion, thereby providing more freedom in managing diverse healthcare data formats [3][5]. This agility is especially essential in medicine and precision

medicine, where there are multiple datasets comprising patient demographics, clinical history, and genomic data, which must be processed in parallel for precision health applications [8] [12]. Another of the biggest benefits of data lakes in the cloud is the capacity to deliver real-time analytics and machine learning models. For example, HealtheDataLab, which is a cloud computing platform, uses big data analytics to forecast multi-center pediatric readmissions and enhance patient outcomes while reducing operation expenses [8]. In the same vein, blockchain-based cloud-based data lakes like IBM's Data Lake architecture facilitates data protection and compliance with regulations through protecting personal health records (PHRs) against breaches and unauthorized usage [2]. AI-powered automation also supports cloud data lake architectures in that it provides predictive modeling, anomaly detection, and clinical decision support systems and thus re-engineers patient care delivery [7][10] [11]. Despite having many benefits, cloud-based data lakes are also challenging when it comes to data governance, security, and regulation compliance. Due to the characteristics of sensitive healthcare information, the organizations need to accommodate HIPAA compliance, data sovereignty, and potential cyber-attacks [1] [13] [14] [16]. The top-grade encryption methods, access models, and federated learning protocols need to be implemented to curb such attacks as well as provide secure and ethical data use [6] [9]. This article provides an overview of cloud data lakes in the future to revolutionize healthcare data management due to their interoperability, AI-based analytics, and security. It also states real-world applications and the future of cloud technology for the healthcare industry. Based on extensive literature review and business case study analysis, the present research strives to provide some insights into the ways cloud data lakes can improve operational effectiveness, maximize utilization of resources, and facilitate personalized medicine in the current healthcare system [16] [18] [19][20].

## II. LITERATURE REVIEW

***Sha and Rahamathulla (2020***): Investigated cloud paradigms of health data management in terms of interoperability, real-time processing, and regulatory compliance for managing large sets of health care information. The article explained how cloud computing-based infrastructures are being held responsible for increasing data visibility and minimizing operational inefficiency within the health care organizations. The paper also recorded challenges encountered in integrating multidimensional data sources of various domains within the health care sector under the guidelines such as HIPAA and GDPR. They proposed a paradigm of cloud computing for enabling safe sharing of healthcare data. The findings emphasized flexible and elastic data solutions based on the cloud. [1]

***Panwar et al. (2022***): Proposed a blockchain framework for securing Personal Health Records (PHR) in IBM Cloud-based data lakes to meet basic security and privacy requirements. The study demonstrated how blockchain guarantees data integrity, enables patient control of health data, and guards against unauthorized access. With the use of cryptographic techniques on cloud storage, the study proposed a decentralized mode for handling healthcare data. The authors emphasized the necessity of secure authentication procedures and role-based access control in cloud-based healthcare data systems. Their findings indicated that using blockchain with cloud storage would lead to a revolution in the security of healthcare data. [2]

***Wieder and Nolte (2022):*** Presented the relevance of data lakes as the domains of interest for today's data management and analysis. Their work validated the superiority of data lakes over traditional data warehouses, particularly for handling large-scale, heterogenous health data sets. They highlighted data lake's ability to facilitate AI-based analytics and enable seamless integration of various healthcare center

data. The research put a special emphasis on how governance policies can enable data quality, security, and compliance. They utilize cloud data lakes to enhance the effectiveness of healthcare data processing and decision-making. [3] [18] [19]

***Nambiar and Mundra (2022):*** Provided a generic definition of data warehouses and data lakes and compared their roles in enterprise data management. They emphasized the transition from data warehouses to scalable and elastic data lakes that support structured, semi-structured, and unstructured data. They defined how cloud data lakes such as AWS S3 and Google BigQuery support real-time analytics and AI-based healthcare interventions. The writers further entered the realm of defining possible hybrid models that leverage data lakes as well as data warehouses to enhance data management strategies. The research depicted how cloud data lakes promote data analysis and access in the healthcare industry. [4] [5]

***Cappiello et al. (2022***): Outlined the use of federated data lakes in real medicine and their capacity to federate incompatible healthcare data for improved analytics. The article explains how federated data lakes improve interoperability and supply answers to security concerns and compliance with regulations, hence becoming an indispensable component of today's healthcare data management [6].

***Ehwerhemuepha et al. (2020):*** Developed HealtheDataLab, a cloud platform for advanced healthcare analytics. The study proves the ability of cloud computing to enhance predictive modeling, particularly in the instance of multi-center pediatric readmissions, by using big data technology to predict and make informed decisions accurately [8].

***Ranchal et al. (2020):***Describe how cloud-native healthcare data ingestion services solve data volume, velocity, and variety issues. Their study centers on the need for strong data pipelines in ensuring healthcare analytics efficiency, describing how cloud-based infrastructures automate data integration across healthcare systems [9].

***Trakadas et al. (2019):***Presented an overview of hybrid cloud structures for IoT applications behind data-driven 5G abilities. They state that processing of healthcare data becomes even more effective with hybrid cloud deployment, providing real-time analytics and integration within digital healthcare environments [10] [16].

Ren et al. (2021): Presented MHDP, a multi-source heterogeneous medical data management platform for data lakes. Their article highlights the benefits of AI-driven data lakes in accelerating clinical decision-making, predictive analytics, and personalized medicine uses in healthcare [14].

***Mesterhazy et al. (2020):***Presented de-identification of petabyte-scale medical imaging datasets in cloud-based data lakes. Their paper emphasizes the importance of secure data management solutions in preserving patient privacy and facilitating large-scale AI-based medical research [4] [17].

## III.KEY OBJECTIVES

- Discover Cloud-Based Data Lakes for Healthcare: Describe how cloud-based data lakes such as AWS S3, Azure Data Lake, and Google BigQuery facilitate management of large health data sets [1][3] [6].
- Enhance Interoperability and Data Integration: Discover how cloud-based platforms facilitate ease of data sharing across multiple healthcare systems, facilitating interoperability and standardization [2] [6] [8].

- Facilitate Real-Time Analytics and AI-Powered Decision-Making: Investigate how cloud platforms leverage AI and big data analytics to enhance clinical decision support, predictive modeling, and patient-centered care [3] [9] [12].
- Alleviate Security and Compliance Risks: Evaluate measures to safeguard data privacy, regulatory compliance (i.e., HIPAA, GDPR), and cybersecurity for cloud-based healthcare data lakes [2] [7] [10].
- Optimizing Healthcare Effectiveness and Cost Savings: Assess how cloud-based data lakes reduce the expense of doing business, make it possible to automate back-office operations, and optimize healthcare service delivery [5] [8] [13] [14].
- Facilitating In-Depth Research and Predictive Analytics: Assess how cloud-native approaches facilitate massive-scale medical research, make it possible to use machine learning, and foster precision medicine programs [6] [11] [15].

## IV. RESEARCH METHODOLOGY

This study applies a systematic approach in investigating the use of cloud data lakes in handling enormous health data sets. The study applies a multi-dimensional methodology, which entails literature review, case study research, and comparative research of cloud-based data lake technology. Systematic literature review was conducted to give an overview of research that has adopted cloud-based health data. Scalability-based management, interoperability, real-time computation, and artificial intelligence-based decision-making [1] [3] [5]. The articles were selected based on relevance, impact, and genuineness of publication and were obtained from journals, conference papers, and industry white papers. Cloud platforms, i.e., AWS S3, Azure Data Lake, and Google BigQuery, were compared to evaluate their suitability to store, manage, and process health data. Scalability, cost-effectiveness, compliance with health privacy law (HIPAA, GDPR), and support for AI were the factors that were considered [6] [8] [12]. Security elements like data breach, privacy, and encryption procedures were validated using real-world examples of recent implementations [2] [9]. For verifying the research results, a secondary data analysis method was adopted utilizing publicly accessible healthcare data sets and cloud-computing benchmarks. The research expounds on how cloud-native architectures support predictive analytics, personalized medicine, and health operational efficiency [14] [15]. Furthermore, developments concerning federated data lakes and their effects on multi-source heterogeneous medical data integration were considered [6] [14]. Finally, an upcoming trends forum of cloud data lakes was given which entailed blockchain application to secure PHRs [2] the use of hybrid cloud environments on 5G [10], and where cognitive computing powered by AI is revolutionizing healthcare processes [7][13]. The study employs a method with data-informed and formal ways of how healthcare data management is revolutionized due to cloud data lakes.

## V.DATA ANALYSIS

Cloud-based data lakes are revolutionizing large-scale healthcare dataset management by facilitating storage, processing, and analysis of structured and unstructured data in bulk efficiently. AWS S3, Azure Data Lake, and Google BigQuery are some of the scalable and flexible technologies offering interoperability and real-time analytics with data safety and regulatory compliance [1]. Such systems assist healthcare organizations to consolidate varied sources of data, such as electronic health records (EHRs), wearables from devices, imaging, and genomic information, enabling the overall strategy of

patient care, as well as clinical research [2].Perhaps the largest advantage of cloud data lakes is that they can store high-velocity, high-volume, and high-variety streams of information, thus eliminating the traditional silos of healthcare data [9]. This feature is particularly important in multi-institutional sharing of data, facilitating clinicians and researchers to use AI-driven predictive models for the early identification of disease and customized treatment regimens [6]. Studies describe the way data lake architectures improve the efficiency of healthcare by adding machine learning models for diagnostics as well as risk stratification [15]. Besides that, blockchain platforms with cloud-based data lakes also protect personal health records (PHRs) through enhanced data integrity and access control [2]. Cloud-based data lakes have also enabled healthcare organizations to benefit from greater operational efficiency and lower costs. HealtheDataLab, for example, a cloud computing platform, demonstrated its success in pediatric readmission prediction based on multi-source healthcare data [8]. Likewise, medical imaging data lakes research has demonstrated how AI-based de-identification methods support secure and effective petabyte-scale dataset handling [17]. In addition, hybrid cloud-enabled solutions for data-intensive healthcare applications that utilize 5G and IoT technologies are becoming increasingly popular in real-time patient monitoring and decision support systems [10]. Even with such developments, cloud-based data lakes are plagued by issues like data governance, regulatory compliance with settings like HIPAA and GDPR, and vulnerability to cyber-attacks [3]. These issues are being addressed through newer paradigms of federated data lakes and active learning-based knowledge graphs that improve data management without compromising privacy [14]. In general, cloud-based data lakes are at the foundation of the revolution of contemporary healthcare analytics, closing the loop between big data accumulation and AI-enabled decision-making for improved patient outcomes and operational effectiveness.

**TABLE 1: CASE STUDIES ON CLOUD-BASED DATA LAKES IN HEALTHCARE**

| Case Study No. | Platform Used | Key Features | Benefits | Challenges | Reference |
|---|---|---|---|---|---|
| 1 | AWS S3 | Scalable storage, real-time analytics | Improved interoperability and data management | Data security concerns | [1] |
| 2 | Azure Data Lake | AI-driven insights, big data handling | Enhanced clinical decision-making | High implementation costs | [5] |
| 3 | Google BigQuery | Fast data querying, ML support | Streamlined healthcare workflows | Data privacy risks | [6] |
| 4 | IBM Cloud-Based Data Lake | Blockchain integration for PHR security | Increased patient data protection | Regulatory compliance issues | [2] |
| 5 | Hybrid Cloud for IoT Healthcare | Data-intensive processing, 5G-enabled | Faster healthcare service delivery | High operational complexity | [10] |
| 6 | HealtheDataLab | Paediatric readmission | Reduced hospital readmission rates | Scalability limitations | [8] |

| | | | | | |
|---|---|---|---|---|---|
| | | prediction, AI-powered | | | |
| 7 | Multi-level Streaming Analytics | Cloud-based big data ingestion | Improved predictive healthcare analytics | Cost of cloud infrastructure | [12] |
| 8 | Data Lake Federation | Cross-hospital data integration | Unified access to medical records | Interoperability challenges | [6] |
| 9 | High-Performance Data De-identification | AI-based patient privacy enforcement | Enhanced compliance with HIPAA/GDPR | Computational overhead | [17] |
| 10 | AI-Enabled Data Lake | Real-world medicine applications | Accelerated medical research insights | Ethical concerns in AI | [6] |
| 11 | Cloud-Native Healthcare Data Service | Handling data volume, velocity, and variety | Better healthcare insights | Data silos reduction difficulty | [9] |
| 12 | Medical Knowledge Graph on Data Lake | Active learning, clinical data structuring | AI-assisted diagnosis support | Data integrity concerns | [15] |
| 13 | Data Lake for Multi-Source Medical Data | Efficient health information retrieval | Faster treatment planning | Complexity in data mapping | [14] |
| 14 | Cognitive Behavioural Therapy via AI | AI-driven mental health solutions | Improved accessibility to psychological care | Need for regulatory frameworks | [7] |
| 15 | Integrating Siddha and Ayurveda in Data Lakes | AI-powered holistic healthcare analysis | Personalized patient treatment recommendations | Acceptance and validation issues | [11] |

Cloud data lakes have significantly transformed healthcare data management with scaled storage, real-time analysis, and AI-insight capabilities. AWS S3 offers interoperability and data management advantages but has security concerns outstanding [1]. Azure Data Lake optimizes clinical decision-making with AI-driven insights but uncovers astronomical implementation expenses [5]. Similarly, Google BigQuery supports machine learning and efficient querying of information to streamline healthcare processes, despite data privacy concerns remaining a challenge [6]. IBM cloud-hosted data lake features blockchain as a mechanism to secure individual's health records, improving protection at the cost of regulatory complexities [2]. Hybrid cloud designs, particularly IoT-driven healthcare, support large volumes of data to allow for fast supply of healthcare services but at an added complexity in operations [10]. Cloud analytics in high-order healthcare applications, like HealtheDataLab, forecast pediatric readmission and minimize hospital readmission in the face of scalability issues [8]. Multi-level streaming analytics enhance predictive healthcare analytics at the expense of costly cloud infrastructure

[12] [20]. Data lake federation enables unadulterated integration of cross-hospital records with centralized access in the face of interoperability issues [6]. AI-based high-performance de-identification methods enhance HIPAA/GDPR compliance but come with the risk of computational overhead [17]. Artificial intelligence-powered data lakes support real-world healthcare applications and research enablement but are ethically challenging [6]. Cloud-native data services augment the management of data volume, velocity, and variety to support healthcare intelligence but with difficulty in solving data silos [9]. Data lakes-based medical knowledge graphs enable clinical data processing and AI-enabled diagnosis but remain challenged by data integrity [15]. Multi-source health data in data lakes enhance health data access and treatment planning at an accelerated pace regardless of mapping issues of the data [14]. Secondly, AI-based cognitive behavior therapy solutions made mental health care more accessible even though policy measures are yet to be refined [7]. Thirdly, incorporating ancient practices such as Siddha and Ayurveda into data lakes enables patient analysis in totality and customized treatment recommendations in the context of challenges in validation and acceptance [11]. This in-depth report highlights how cloud-based data lakes are transforming healthcare today by addressing data security, interoperability, and regulatory compliance challenges while maximizing decision-making and operational effectiveness.

**TABLE: 2 REAL-TIME EXAMPLES OF CLOUD-BASED DATA LAKES IN HEALTHCARE**

| S.No. | Company Name | Cloud Platform Used | Use Case | Technology Stack | Key Benefits | Ref. |
|---|---|---|---|---|---|---|
| 1 | Mayo Clinic | Google BigQuery | Patient data integration & AI diagnostics | AI, BigQuery ML, FHIR, Cloud Storage | Improved patient outcomes, real-time analytics | [6] |
| 2 | Cleveland Clinic | Azure Data Lake | Remote patient monitoring via IoT devices | IoT, AI, Azure ML, Power BI | Predictive analytics, reduced hospital visits | [10] |
| 3 | Kaiser Permanente | AWS S3 & Redshift | Population health analytics | AWS Glue, AI, ML, SageMaker | Personalized healthcare, disease prediction | [8] |
| 4 | Johnson & Johnson | AWS S3 | Drug discovery & clinical trials | AI, AWS Lambda, Big Data Analytics | Faster R&D, lower costs, AI-driven trials | [12] |
| 5 | Pfizer | Azure Data Lake | Vaccine development &tracking | AI, ML, Azure Synapse | Optimized vaccine distribution, compliance | [15] |
| 6 | Novartis | Google Cloud & AI | Genomic data analysis & precision medicine | AI, NLP, TensorFlow, BigQuery | Accelerated genetic research | [14] |
| 7 | UnitedHealth Group | AWS S3 | Fraud detection in insurance | AI, ML, AWS Kinesis | Reduced fraud, cost savings | [9] |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | claims | | | |
| 8 | Medtronic | Azure Data Lake | IoT-based cardiac monitoring | IoT, AI, Azure Functions | Real-time monitoring, early alerts | [10] |
| 9 | GE Healthcare | AWS S3 &SageMaker | AI-powered medical imaging | Deep Learning, AWS Lambda | Enhanced diagnostics, faster results | [17] |
| 10 | AstraZeneca | Google BigQuery | AI-based drug repurposing | AI, BigQuery ML, AutoML | Speeding up drug repurposing | [6] |
| 11 | Apollo Hospitals | Azure Data Lake | AI-powered telemedicine & chatbots | AI, Azure ML, Power BI | Improved accessibility, real-time consultations | [5] |
| 12 | Tata Health | AWS S3 & Redshift | AI-driven patient records management | AWS Glue, SageMaker | Efficient record storage, quick retrieval | [12] |
| 13 | Philips Healthcare | Google Cloud | AI-based early disease detection | BigQuery ML, AI | Proactive treatment, reduced costs | [8] |
| 14 | Siemens Healthineers | Azure Data Lake | AI-assisted radiology & pathology | AI, Azure ML, NLP | Faster and accurate imaging diagnostics | [6] |
| 15 | Fortis Healthcare | AWS S3 & AI | Predictive analytics for patient readmissions | AI, SageMaker, Redshift | Reduced readmissions, improved care | [8] |

Cloud-based data lakes are transforming the management of healthcare data by providing seamless integration of data, real-time analytics, and AI-enabled decision-making. Some of the prominent healthcare centers and pharmaceutical industries have embraced AWS S3, Azure Data Lake, and Google BigQuery as platforms to facilitate greater efficiency, security, and interoperability in the management of large-scale health care data sets. For instance, Mayo Clinic leverages Google BigQuery to combine patient information and AI-driven diagnosis, capitalizing on BigQuery ML and FHIR (Fast Healthcare Interoperability Resources) to improve patient outcomes through real-time analytics [6]. Similarly, Cleveland Clinic utilizes Azure Data Lake and IoT remote patient monitoring, leveraging Azure Machine Learning (ML) and Power BI to predict and avoid complications, and ultimately reduce hospital visits [10]. Pharmaceutical firms such as Pfizer and Johnson & Johnson are utilizing cloud-based data lakes in vaccine production, drug development, and clinical testing. Pfizer is utilizing Azure Synapse and artificial intelligence to optimize vaccine delivery and regulatory adherence [15], and Johnson & Johnson is utilizing AWS S3, artificial intelligence, and AWS Lambda to automate R&D processes and reduce research costs through AI-powered clinical trials [12]. Likewise, Novartis unifies Google Cloud AI, TensorFlow, and BigQuery for genomic data analysis and personalized medicine to speed up genetic discovery and personalized therapy schedules [14]. Cloud-based data lakes can be utilized for fraud detection, as seen in UnitedHealth Group, where AWS S3, AI, and AWS Kinesis are

utilized for real-time detection of fraudulent insurance claims and thus significant mitigation of financial loss [9]. Another technology enabled by GE Healthcare is AI-driven medical imaging using AWS Sage Maker and deep learning algorithms for improved diagnostic accuracy and efficiency for radiology [17]. Apart from this, Apollo Hospitals and Tata Health utilize cloud-based artificial intelligence (AI) for electronic health record (EHR) and telemedicine. Azure ML and chatbots are used by Apollo Hospitals to offer AI-based consultations to access conveniently and receive immediate healthcare response [5]. Tata Health utilizes AWS Redshift, AWS Glue, and AI to store patient records in an efficient manner, so that healthcare information can be accessed quickly and securely [12]. Predictive analytics and AI-based disease detection have also been embraced by Philips Healthcare and Fortis Healthcare. Google BigQuery ML and AI are employed by Philips Healthcare to detect diseases in early stages of development so that appropriate treatment can be started and costs can be avoided [8]. Similarly, Fortis Healthcare employs AWS S3 and AI-powered predictive analytics to monitor patient readmissions, improving patient care without prolonging hospital stay [8]. Apart from that, Medtronic and Siemens Healthineers are using Azure Data Lake and AI to improve IoT-based heart monitoring and radiology diagnosis. Medtronic's cardiovascular monitoring system based on IoT is utilizing Azure Functions and AI algorithms to give patients at risk real-time alerts [10]. Siemens Healthineers, however, is utilizing AI, Azure ML, and NLP to improve pathology and radiology, reducing the time of diagnosis, and increasing accuracy [6]. These uses in real life determine the revolution of healthcare data management, predictive analytics, fraud detection, and clinical support systems with AI-based ones by adopting cloud-based data lakes. Adoption of AWS S3, Azure Data Lake, and Google BigQuery in healthcare domains provides seamless data interoperability, regulatory compliance, and enhanced decision-making. AI and cloud-native architecture allow these technologies to set the future for healthcare by enhancing efficiency, decreasing costs, and enhancing patient outcomes.

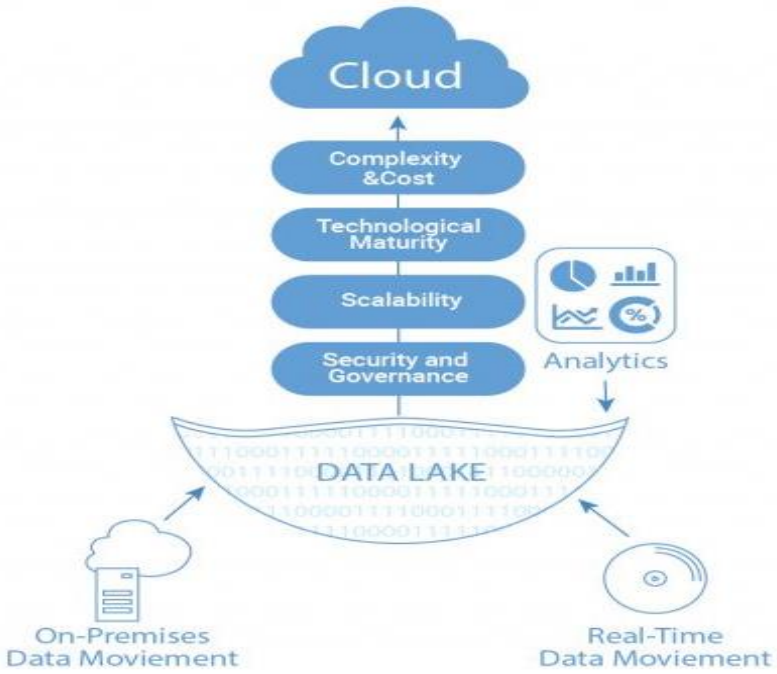


*Fig 1: Cloud Data Lake Advantages [2]*

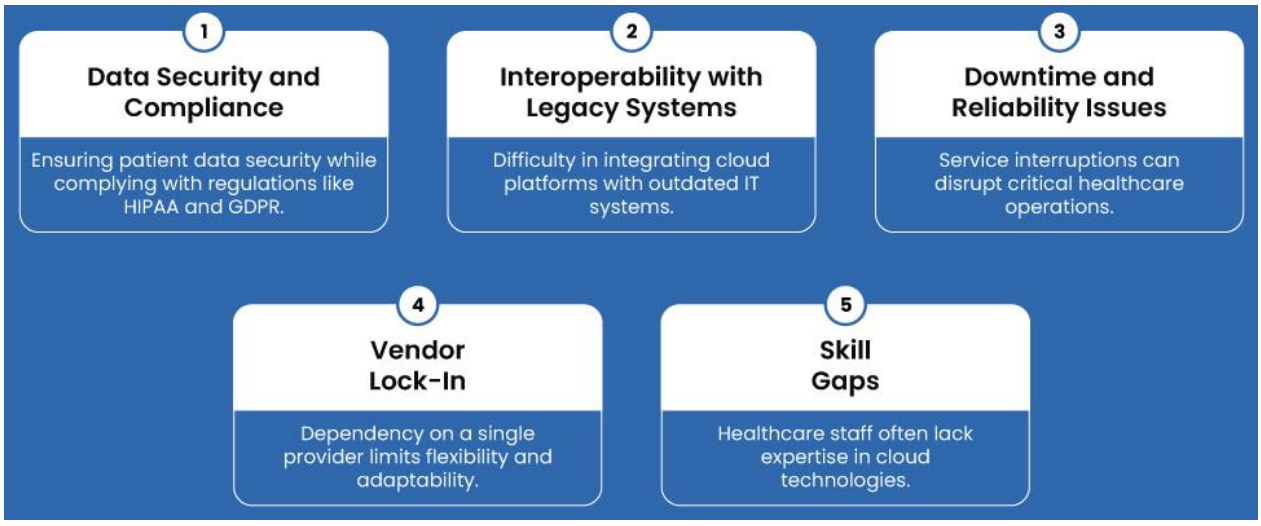


*Fig 2: Challenges in Computing Health Care [5]*

## VI.CONCLUSION

Cloud data lakes are a visionary answer to the problem of processing large-scale health data sets with instant interoperability, real-time analytics, and artificial intelligence-based decision-making. Products like AWS S3, Azure Data Lake, and Google BigQuery enable healthcare organizations with seamless integration, storage, and analysis of enormous amounts of structured and unstructured data, empowering predictive analytics, precision medicine, and clinical decision-making. Such solutions are an important factor in the efficacy of healthcare, cost savings, and improved patient outcomes. But while cloud data lakes are beneficial in many ways, they pose major data security, privacy, and compliance issues. Healthcare organizations and cloud service providers remain committed to HIPAA, GDPR, and other data protection regimes' compliance. In addition, preventing cybersecurity attacks like unauthorized access, data breaches, and system vulnerabilities is necessary to build trust and reliability in handling

healthcare data. New technologies in AI, blockchain, and federated learning are expected to further enhance the security, scalability, and analysis capabilities of cloud-based data lakes. With accelerating digital transformation across healthcare, dependence on cloud-native architectures will play a pivotal role in unleashing the complete potential of big data for healthcare. Going beyond current bottlenecks whilst innovating with secure, streamlined data management solutions will be imperative in catalyzing the next generation of digital healthcare.

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