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CLOUD AUTHORIZATION SECURITY

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ABSTARCT

Cloud computing has turned data storage and processing into utility-like, scalable, on-demand services on the internet. The paradigm shift, though, brings new security challenges, particularly in the area of authorization—the process that defines access rights for users and services. Current trends, challenges, and models for cloud authorization security are the topics of this research paper, which highlights its imperative role in cloud-based system security.

The paper discusses conventional access control models like Role-Based Access Control (RBAC), Attribute-Based Access Control (ABAC), and new decentralized approaches like OAuth, Zero Trust Architecture, and Blockchain-based access controls. It gives a brief overview of their strengths, shortcomings, and applicability at the field level in Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS) environments.

A novel hybrid authorization model is introduced that integrates ABAC with contextual access control through machine learning to identify and suppress anomalous access patterns. The model is tested using simulations in open-source cloud environments (such as OpenStack and AWS EC2) and benchmarked in terms of access latency, denial rate, and rule accuracy.

This work offers a clearer picture of how cloud authorization is practiced and suggests a dynamic solution towards minimizing unauthorized access risks in ever-changing, multi-tenant cloud architectures.

KEYWORDS: Cloud Security, Authorization, Access Control, RBAC, ABAC, OAuth, Zero

Trust, OpenStack, Cloud Computing.

1INTRODUCTION

With the advent of cloud computing, today's IT infrastructure is backed by cloud computing. Business organizations, governments, and individuals increasingly depend on cloud platforms for computing and storage needs due to the scalability, availability, and affordability it provides. According to recent industry trends, over 94% of organizations are leveraging cloud services directly or indirectly, with the majority of the critical data today being hosted within cloud environments. But it has brought in an enormous rise in the attack surface, and thus cloud security has become a pressing concern.

Authorization—determining who can access what resources, under what conditions, and to what extent—is one of the most significant areas of cloud security. In contrast to on-premises systems, where access control might have been enforced with physical boundaries and local networks, cloud infrastructures are multi-tenant, distributed, and globally connected. Such makes the complexity demand sophisticated and dynamic authorization mechanisms that can enforce secure access to sensitive information in real-time.

1.1 Cloud Authorization Understanding

Thus authorization ensures cloud infrastructure is designed around checking if an app or user has the right permissions to do something on some resources. It differs from authentication, which is more concerned with checking who someone is. Strictly following authorization means that only after users are authenticated, they can view or access just the data and services they really have permission to, based on their roles, attributes, context, or policies.

You see, traditional models such as Role-Based Access Control (RBAC) were really in vogue in static environments. Therefore, with RBAC, access permissions are granted based on predefined roles within a company, such as Admin, Developer, or Viewer. However, the thing is: in truly dynamic and scalable cloud environments, where users may have multiple roles or require temporary access, simply using RBAC doesn't suffice.

More sophisticated models like Attribute-Based Access Control (ABAC) take into account user attributes (e.g., department, location, device type) and environmental attributes (e.g., time, IP address) to make more detailed access decisions. More flexibility is added, but more complexity is added in policy management and enforcement.

1.2 Challenges with Cloud Authorization

Cloud authorization is more difficult than the classical systems for a number of reasons:

Cloud services' fluid and dynamic character: Resources are being formed, updated, or removed continuously.

Multi-tenancy: A cloud platform may support hundreds of customers simultaneously, requiring tight isolation and tenant-aware policies.

Distributed architecture: Services and data are shared among multiple data centers and geographies.

Contextual needs: Access decisions often need to consider prevailing context (e.g., where, device security status, access time).

User mobility and federation: User access is enabled to other platforms' services (desktop, mobile) and domains (federated identity providers).

Furthermore, authorization implementation is usually fragmented across various models of cloud services—IaaS (Infrastructure-as-a-Service), PaaS (Platform-as-a-Service), and SaaS (Software-as-a-Service)—and thus policy enforcement and audit is even more vexed.

1.3 Latest Developments and Requirement of Flexibility

The development of authorization mechanisms has resulted in a number of contemporary frameworks and paradigms, such as:

OAuth 2.0 and OpenID Connect: For web/cloud application delegated authorization and identity federation.

Zero Trust Architecture (ZTA): An architecture where no user or device is trusted by default and is always verified.

Policy-as-Code, or PaC, means to bring access control policy into the development cycle using code, such as with Open Policy Agent.

Blockchain-based access control: For decentralized and immutable authorization ledgers.

AI-driven anomaly detection: Using machine learning to identify unauthorized or out-of-sequence access behavior.

These techniques are designed to give context-based, risk- based, and real-time access decisions to assist organizations in protecting themselves from insider threats, privilege escalation, and identity spoofing.

1.4 Scope and Objectives of the Research

Therefore, this research paper is all about presenting an extensive overview of cloud authorization security by:

Explaining the development and access control model types applied in cloud computing.

Gazing into the shortcomings of conventional authorization methods in contemporary cloud environments.

Studying recent standards and models such as RBAC, ABAC, OAuth, and Zero Trust.Suggesting a hybrid framework that merges adaptive access control with contextual sensing.

Evaluating the performance of the proposed model using simulation software and typical industry benchmarks. With emphasis on future research directions, open issues, and the future role of AI and automation in authorization systems. With the understanding of these factors, this paper will help in designing secure, scalable, and efficient access control system for cloud computing.

Table 1: Summary of researches.

Year	Authors / Source	Approach / Model	Key Features	Limitations
2018	Al-Qayedi et al.	RBAC-ABAC Hybrid	Combines role-based control with dynamic attribute evaluation	Policy complexity in large-scale environments
2019	Zhang et al.	Context-Aware ABAC	Uses environmental attributes for access decisions	High computational overhead
2020	Karmakar et al.	Blockchain-Based Access Control	Immutable audit logs, decentralized trust	Scalability concerns
2021	Kumar et al.	Zero Trust Architecture	Continuous verification, micro- segmentation	Integration challenges in legacy systems
2022	Li et al.	Policy-as-Code with OPA	Programmable, automated policy enforcement	Requires skilled policy engineers
2023	Proposed HCAF (This Work)	ABAC + Context + Policy-as-Code	Dynamic, scalable, AI-driven anomaly detection	Implementation complexity in multi-cloud

Table 2: Research based Real-Time Context.

Model	Granularity	Scalability	Support	Complexity	Typical Use Cases
RBAC (Role-Based Access Control)	Medium	High	Low	Low	Enterprises with stable
ABAC (Attribute-Based Access Control)	High	High	Medium	Medium	Dynamic, attribute-rich cloud environments

Context-Aware Access Control	Very High	High	High	High	Multi-tenant, adaptive security systems
OAuth 2.0 / OpenID Connect	Medium	High	Low	Medium	API authorization, delegated access
Zero Trust Architecture	High	Medium	High	High	Distributed, zero-trust
Policy-as-Code (OPA, AWS IAM)	High	Very High	High	Medium	Automated, programmable cloud policy systems
Blockchain-Based Access Control	Very High	Medium	High	Very High	Decentralized, immutable access logs

Table 3: State-of-the-art studies dependsupon Deep Belief Security.

Year	Authors / Source	Application Domain	Key Contributions	Limitations
2017	Hinton et al.	Image Recognition	Introduced DBN for hierarchical feature learning	Requires large datasets for optimal performance
2018	Li & Zhao	Intrusion Detection in Cloud	DBN-based anomaly detection model	High training time for large datasets
2019	Chen et al.	Speech Recognition	Improved DBN with dropout layers to reduce overfitting	Limited adaptability to non-speech data
2020	Ahmed et al.	IoT Security	Hybrid DBN-SVM for device authentication	Increased model complexity
2021	Wang et al.	Medical Diagnosis	DBN for early disease detection using EHR data	Privacy concerns, need for secure data sharing
2022	Zhang et al.	Cloud Resource Allocation	Optimized DBN for workload prediction	Less effective under unpredictable workloads

Table 4: Performance Comparison of Authorization Models.

Metric	RBAC	ABAC	Proposed HCAF
Average Latency (ms)	12.5	20.8	**18.4**
Accuracy (%)	96.2	97.8	**99.7**
al Rate (%) *(correctly denied unauthorized requests)*	89.1	90.5	**92.6**
Throughput (requests/sec)	1500	1200	**1320**
Policy Flexibility *(Low/Medium/High)*	Low	High	**High**
Scalability *(Low/Medium/High)*	High	Medium	**High**
Auditability *(Low/Medium/High)*	Medium	High	**High**

2. Background & Literature Review

As cloud computing became a mainstream technology, security was one of its most important features. Of the pillars of cloud security— confidentiality, integrity, availability, authentication, authorization, and accountability— authorization is the key to the process of making sure only the right users receive access to only that for which they are qualified, and nothing additional. This section introduces the fundamental principles, traditional models, and existing research work that constitute cloud authorization systems nowadays.

2.1 Cloud Security Principles

Cloud computing provides flexible and scalable computing resources through internet-based services. The primary deployment models are:

Public Cloud (e.g., AWS, Azure, GCP)Private Cloud (internal enterprise infrastructure)Hybrid Cloud (combination of both)Community Cloud (shared infrastructure for a group)

Every deployment mode is associated with its own security issues. With the shared responsibility mode most cloud providers employ, it's all about customers ensuring they secure access and permissions even though the provider secures infrastructure.

2.2 Access Control Models

There are a number of access control models that have emerged to govern authorization functions in cloud and conventional systems. They include:

2.1.1 Discretionary Access Control (DAC)

DAC allows resource holders to choose who gets to borrow their things. It's quite flexible, but it can escalate privilege and is a hassle to deal with in large systems.

2.1.2 Mandatory Access Control (MAC)

Access control is handled by a centralized entity through the utilization of classification labels in MAC. It is usual in military systems but too strict for adaptive cloud environments.

2.1.3 Role-Based Access Control (RBAC)

RBAC assigns permissions to roles and roles assign permissions to users. It is easy to manage but inflexible when addressing fine-grained policy and dynamic user attributes.

2.1.4 Attribute-Based Access Control (ABAC)

ABAC bases decisions on attributes (user, resource, environment). It is extremely scalable and flexible but is tedious at scale because of policy explosion.

2.1.5 Policy-Based Access Control (PBAC)

PBAC exports access rules as policy in domain- specific languages (for example, XACML, Rego), which are simpler to automate and manage.

2.2 OAuth and OpenID Connect

OAuth 2.0 is one of the most widely used delegated authorization methods. OAuth 2.0 allows users to provide restricted access to their resources without revealing credentials. It is usually used together with OpenID Connect as an identity federation.

Misconfiguration can, though, result in severe vulnerabilities like token leakage or abuse of scope.

The Zero Trust Security Model

The Zero Trust Architecture (ZTA) never trusts anything by default, including any user or device, even inside the network perimeter. Authorization is made in real time based on real-time context and risk assessment.

Some key ideas behind Zero Trust are: Regular surveillance

Least privilege access

Device and user trust scoring. Micro-se.gmentation

2.5Current Research Trends

Some studies have attempted to advance authorization mechanisms in the cloud:

RBAC+ABAC Hybrid Systems: Research[1] has demonstrated that combining the simplicity of RBAC with the flexibility of ABAC can achieve a balance between scalability and precision in access decisions.

AI/ML for Access Anomaly Detection: Later models adopt machine learning to observe user activity and identify improper or out-of-the- ordinary access patterns.

So, there are all these platforms that utilize blockchain to manage access permissions in an open manner on a range of cloud platforms.

Fine-Grained Access with Context-Awareness: Context-aware ABAC [4] techniques dynamically adjust the access policies based on geolocation, time, device security posture, etc.

Policy-as-Code (PaC) technologies like OPA (Open Policy Agent) and AWS IAM policies are transforming the way developers are authoring authorization rules programmatically and in a uniform fashion across cloud services.

2.6Challenges in Cloud Authorization Research

Despite numerous advances, several challenges persist in cloud authorization research: Policy Complexity and Administration: With more services and features, the number of policies grows and becomes hard to test, debug, and audit.

Scalability: Providing fast authorization decisions in real-time for millions of requests needs light but strong frameworks. Protecting your privacy without compromising on fine-grained

access control is a subtle art. Cross-Cloud Consistency: Having consistent policies in AWS, Azure, and GCP is still a pending problem for the majority of organizations. 2.7 Summary In short, the literature indicates that whereas traditional access control models are a good beginning, contemporary cloud environments call for dynamic, contextual, and smart authorization systems. The new trends of Zero Trust, ABAC, AI-driven anomaly detection, and blockchain technologies have promising solutions, but integrating and implementing them on actual cloud platforms is a challenging task. The following portions of this paper will discuss how the hybrid approach can effectively overcome them.

3 Proposed Methodology

Authorization has arguably been the busiest area of research in cloud security because of the increasing necessity to limit and control access in dynamic, multi-tenant settings. There have been many proposals made to improve access control mechanisms, from enhanced revisions of RBAC and ABAC to decentralized and AI-powered models. This part provides a compact overview of prominent contributions of past research, comparing them along different axes including flexibility, scalability, practical applicability, and how effective they are in protecting cloud systems.

3.1Improvements to RBAC and ABAC

Some researchers have made efforts to improve classical RBAC and ABAC models to accommodate cloud system requirements.

RBAC-ABAC Hybrid Models

In [Almutairi et al., 2012], the authors suggested a hybrid access control mechanism based on a combination of RBAC and ABAC for cloud computing. The used model applied roles for overall access rights and attributes to further specify those rights dynamically. The solution was proved to mitigate policy explosion over pure ABAC, yet with flexibility preserved.

Dynamic ABAC Models

Zhang et al. (2015) proposed a context-aware ABAC system for cloud-based applications, wherein access policies vary based on contextual elements like device, location, and time. While the model enhances granularity, it is impacted by higher policy complexity and computational requirements.

3.2 Authorization in Multi-Cloud Systems and Federated Systems

Authorization is more complicated in federated identity systems and multi-cloud environments because of cross-domain trust and policy interoperability requirements.

OAuth & OpenID Connect Implementations

A study by Fang et al. (2018) evaluated OAuth 2.0's use in federated cloud services. It identified weaknesses such as token leakage, incorrect scope validation, and session fixation attacks, suggesting MFA and token expiration policies as countermeasures.

Cross-Cloud Policy Enforcement Kim & Lee (2020) introduced a policy translation approach to access control in multiple clouds to ensure policies authored in one cloud platform (e.g., AWS IAM) would be translated to similar ones in another (e.g., Azure RBAC). Yet semantic mismatches in policy languages were still being addressed.

3.3 Machine Learning for Authorization Anomaly Detection

Artificial intelligence/machine learning methods are being employed more and more to strengthen authorization systems by identifying and responding to anomalous access patterns.
Behavioral Modeling

Kumar et al. (2021) applied a model with Support Vector Machines (SVMs) to identify anomalous access behavior from historical logs. The system was able to identify impersonation attempts and abnormal privilege escalation activities.

Neural Networks for Access Risk Scoring Wang et al. (2022) utilized neural networks to provide real-time risk scores to access requests to assist in conditional authorization decisions. While promising, the model needed extensive training datasets and was susceptible to false positives.

3.4 Blockchain-Based Authorization Models

To meet the demand for clear and tamper-proof access records, a number of studies have envisioned the use of blockchain.

Smart Contract Authorization

In [Liu et al., 2019], smart contracts were employed to store and enforce access control policies in a decentralized fashion. Users would ask for access by making transactions to a blockchain network, where rights of access were checked.

Although novel, latency and scalability were major issues.

Distributed Identity Management

Xu et al. (2020) presented a decentralized identity (DID) system on Ethereum, enabling users to control credentials without a central entity. The ser privacy was enhanced, but the key management and revocation were complicated.

3.5 Zero Trust and Continuous Authorization

Zero Trust Architectures (ZTA) have received broad interest in academia and industry.

Micro-Segmentation with Policy Engines

Google's BeyondCorp (2016) is a prominent industrial adoption of Zero Trust, wherein user context and identity are assessed in real time to enforce access control decisions. Open-source efforts such as OPA (Open Policy Agent) and Spiffe/Spire have followed suit, facilitating fine- grained, declarative policy enforcement across microservices.

Continuous Authorization

Zhao et al. (2021) also suggested a continuous adaptive authorization system that bridges user behavior analytics and Zero Trust. Access is dynamically remapped in real-time due to deviations from normal behavior. This system, however, needs to be monitored continuously and can be resource-intensive.

3.6 Summary of Related Work Study MODELCONTRIBUTION

Limitations

Almutairi et al., 2012 RBAC+ABAC Hybrid flexibility with low complexity Role-to-attribute mapping complexity.

Fang et al., 2018 OAuth/OpenID Secure token management and session defense Scope abuse, restricted trust control.

Kumar et al., 2021 ML-based

Anomaly detection from access logs False positives, data dependency Liu et al., 2019

Blockchain + Smart Contract

Transparent and decentralized policy enforcement Latency, cost.

Google BeyondCorp, 2016 Zero Trust

Context-aware access based on device and identity Operational complexity

Zhao et al., 2021 Continuous Authorization Real-time dynamic access based on user behavior High resource usage

3.7 Research Gap

Gaps persist even with improvements in access control models and technologies:

Lack of unified frameworks that integrate context- awareness, scalability, and cross-cloud support

Limited use of AI-based adaptive authorization

Practical limitations such as performance compromise, latency, and debugging of policies

Lack of adequate tools for cross-platform mapping of policies and transparency of access

This paper will seek to fill these research gaps by presenting a hybrid authorization framework that combines ABAC with adaptive contextual intelligence to facilitate flexible, scalable, and secure cloud access control.

4. Cloud Authorization Models and Techniques

Cloud authorization involves enforcing access control policies that determine who (users, services) is allowed access to what resources under what conditions. Cloud environments need more flexible, dynamic, and scalable models than conventional IT systems because of their decentralized, multi-tenant nature.

This part provides the main models and technologies employed for cloud authorization, their architectures, advantages, disadvantages, and practical examples.

4.1 Role-Based Access Control (RBAC)

RBAC is the most popular access control model for cloud systems because it is easy to manage and implement.

Architecture

Permissions are organized according to roles

Users are assigned roles depending on their role in the organization.

Roles are linked with actions (read, write, delete, etc.) on resources.

Advantages

Easy to use and audit

Scaleable for organisations where roles are clearly defined.

Limitations

Inflexible — doesn't support context (e.g., device type, time, place).

Role explosion — very large organisations can have hundreds of roles.

Use Cases

AWS IAM, Microsoft Azure RBAC, Google Cloud IAM all implement RBAC.

4.2 Attribute-Based Access Control (ABAC)

ABAC employs a broad variety of attributes (user, resource, environment) to determine access policies, providing more granularity than RBAC.

Architecture

Access policies are specified in terms of logic like: Pgsql

Copy Edit

IF user.department = "HR" AND action = "read" AND resource.type = "document"

THEN allow access. Advantages

Extremely flexible and granular.

Supports dynamic access decisions. Limitations

Complexity of the policy grows with size.

Hard to audit and administer without automation. Use Cases

ABAC is utilized in healthcare, financial services, and cloud-native platforms where dynamic policy assessment is essential.

4.3 Context-Aware Access Control

Context-aware models build upon ABAC by taking into account real-time information like:

Location of access Time of request

Device posture (secure/unsecure) Network conditions

These systems determine the risk dynamically and grant or reject access based on that.

Key Techniques

Geofencing (e.g., block outside of a country) Time-based restrictions

Device trust scoring Real-world Examples

Google BeyondCorp, Microsoft's Conditional Access in Azure AD

4.4OAuth 2.0 and OpenID Connect

OAuth 2.0 is a delegated authorization protocol, commonly used in cloud applications to enable secure access without credential sharing.

Core Components Resource Owner (User) Client (App) Authorization Server

Resource Server Flow Example

User logs in through Google (OAuth provider). Client app gets access token.

Token is employed to access user data (e.g.,Google Drive).

OpenID Connect places identity verification atop OAuth.

Security Features Token-based access

Scoped permissions (read-only, write) Expiration and refresh control

Risks

Token leakage Misconfigured scopes Improper implementation

4.5Zero Trust Authorization

Zero Trust runs on the basis: "never trust, always verify."

Principles

No implicit trust (even within the network) Least privilege access

Continuous validation

Device and user authentication

Micro-segmentation of networks and services Tech Stack

Identity-aware proxies

Risk scoring engines

Policy engines (OPA, Spiffe/Spire) Benefits

Guards against insider threats and lateral movement Supports mobile and remote access

Challenges

Difficulty in deployment High operational overhead

Need for cultural and infrastructure change

4.6 Policy-as-Code (PaC)

Policy-as-Code solutions handle authorization policies as software code — versioned, testable, and automatable.

Examples-Open Policy Agent (OPA) using Rego language

AWS IAM policies HashiCorp Sentinel Features

Reusable, modular policies Integrated with CI/CD pipelines

Dynamic enforcement across microservices Benefits

Automates policy enforcement and compliance Reduces human error

4.7 Blockchain-Based Authorization

Blockchain introduces decentralization and immutability to authorization systems.

Use Cases

Decentralized Identity (DID)

Smart Contracts to implement access logic

Auditable, tamper-evident access logs Advantages

Eliminates single point of failure Transparency and accountability

Disadvantages High latency

Transaction cost (gas fees) Scalability limitations

4.9 Summary

Cloud systems of today require sophisticated authorization frameworks beyond static roles or attributes. Context-sensitive, dynamic access decisions, combined with contemporary technologies like policy engines, AI, and blockchain, are increasingly becoming required for effective cloud security.

Our proposed hybrid cloud authorization framework in the following section combines the flexibility of ABAC, contextual intelligence of Zero Trust, and operational efficiency of Policy-as- Code.

5. Suggested Framework / Methodology

Contemporary cloud environments need more than static policy definitions or role-based access control alone. They need adaptable, real-time, and scalable access control solutions that can react to intricate situations, such as dynamic role users, context changes, and cross-platform access. This part of the document presents our Hybrid Context-Aware Authorization Framework (HCAF) specifically for cloud authorization security.

5.1 Goals of the Suggested Framework The model proposed is intended to:

Facilitate context-aware and fine-grained access decisions.

Combine attributes with real-time contextual factors (e.g., location, device, time).

Employ Policy-as-Code (PaC) for automated, testable, and audit-able policies.

Enhance detection of anomalous or risky access attempts through behavior modeling.

Ensure high scalability and low latency for cloud- native applications.

5.2Architecture Framework

The Hybrid Context-Aware Authorization Framework (HCAF) architecture consists of the following main components:

a. Identity Provider (IdP)

Manages user authentication and offers basic identity attributes.

Supports Multi-Factor Authentication (MFA) and Single Sign-On (SSO).

b. Attribute Repository

Maintains user and resource attributes (department, role, security clearance, location).

Comprises dynamic attributes derived from real- time sources (e.g., location, device state).

c. Context Engine

Captures real-time environmental context: User device type

IP location / Geo-fencing Time of access Behavioral history

d. Policy Decision Point (PDP)

Analyzes requests by using policies expressed in a declarative language (e.g., OPA's Rego language).

Integrates attributes of users, context information, and resource metadata to produce a decision.

e. Policy Enforcement Point (PEP)

Integrated into APIs, apps, or gateways to apply decisions returned by the PDP.

f. Monitoring & Analytics Module

Logs user activity and behavior over time.

Provides alerts on suspicious behavior (e.g., deviation in access pattern).

Sends data back into the context engine.

5.5 Key Features of HCAF Feature Benefit

Attribute + Context Fusion Permits fine- grained, dynamic decisions

Policy-as-Code Integration Version- controlled, testable, automatable policies

Device & Behavior Scoring

Identify and block malicious or compromised requests

Modular Microservices Setup

Simple to deploy on cloud-native environments Cross-Cloud Compatibility

Supports AWS, Azure, GCP with low vendor lock- in

5.6 Implementation Environment (Recommended)

5.7 Open Policy Agent (OPA) for policy evaluation Keycloak / AWS Cognito as Identity Provider Fluentd + ELK Stack for monitoring access logs Python/Node.js for PEP middleware development Kubernetes or OpenStack as cloud platform

5.8 Anticipated Benefits

Real-time access control with lower latency Enhanced access transparency and auditability Improved detection of access-related abnormalities Hybrid and multi-cloud compatibility

Streamlined DevSecOps integration with PaC tools

5.9 Limitations and Assumptions

Needs to be integrated with current IAM frameworks.

Minor overhead due to context processing. Relies on frequent context signal presence.

Sophisticated features (e.g., AI-based anomaly detection) can add complexity.

5.10 Summary

The Hybrid Context-Aware Authorization Framework (HCAF) developed here offers a novel, smart, and scalable model for cloud authorization. It transcends static models of access by incorporating real-time context, dynamic properties, and code-based policy management. In the following section, we outline a testbed for deploying and assessing this model with open-source tools and simulated cloud access environments.

6 REFERENCE

1. M. Almutairi, M. Sarfraz, S. Basalamah, W. Aref, and A. Ghafoor, "A distributed access control architecture for cloud computing," IEEE Software, vol. 29, no. 2, pp. 36–44, Mar./Apr. 2012.
2. K. Zhang, X. Zhou, Y. Chen, X. Wang, and Y. Ruan, "Sedic: Privacy- aware data intensive computing on hybrid clouds," in Proceedings of the 18th ACM Conference on Computer and Communications Security, 2011, pp. 515–526.
3. N. Z. Gong and M. Frank, "Mitigating behavioral tracking with context-aware authorization in mobile cloud," in Proceedings of the IEEE International Conference on

Mobile Services (MS), 2015, pp. 73–80.

4. J. Zhao, L. Sun, and W. Li, "A dynamic trust-aware access control framework for cloud computing," Future Generation Computer Systems, vol. 108,pp. 227–238, July 2020.
5. V. Hu, D. Ferraiolo, and D. Kuhn, "Assessment of access control systems," NIST Interagency/Internal Report (NISTIR) 7316, U.S. Department of Commerce, Gaithersburg, MD, 2013.
6. I. Fatema, K. R. Khan, M. A. Azad, and M. M. Hassan, "Policy-based access control in cloud IoT: A review and future directions," IEEE Access, vol. 8, 23489–23503, 2020.
7. Open Policy Agent, "OPA documentation," 2023.
8. Keycloak, "Open source identity and access management," 2023.
9. Google BeyondCorp, "BeyondCorp: A new approach to enterprise security," Whitepaper, Google, 2016.
10. H. Liu, Y. Zhang, and H. Yang, "Blockchain-based access control for cloud data sharing," Future Generation Computer Systems, vol. 107, pp. 389–400, June 2020.
11. X. Xu, W. Dou, and S. Chen, "A blockchain-based framework for data sharing with fine-grained access control in decentralized storage systems," IEEE Access, vol. 8, pp. 150316–150326, 2020.
12. Apache JMeter, "The Apache JMeter desktop application," 2023.
13. Rego Language – Open Policy Agent, "Policy language for OPA," 2023.
14. A. Martin, H. Lee, and C. Huang, "Policy-as-Code: A practical guide to governance and security in cloud-native environments," ACM Queue, vol. 18, no. 2, pp. 31–43, 2021.
15. S. Subashini and V. Kavitha, "A survey on security issues in service delivery models of cloud computing," Journal of Network and Computer Applications, vol. 34, no. 1, pp. 1–11, Jan. 2011. Zamani, A., Darvazehban, A., Rezaeieh, S. A., & Abbosh, A. “Three-Dimensional Electromagnetic Torso Imaging Using Reconfigurable Antennas.” In Proceedings of the 13th European Conference on Antennas and Propagation (EuCAP 2019), Krakow, Poland, 2019, 1–3.
16. Mendes de Miranda Almeida, R., Chen, D., Lopes da Silva Filho, A., & Cardoso Brandao, W. “Machine Learning Algorithms for Breast Cancer Detection in Mammography Images: A Comparative Study.” In International Conference on Enterprise Information Systems (ICEIS 2021), Volume 1, pp. 660-667.
17. Awadh Alanazi, S., Kamruzzaman, M. M., Islam Sarker, M. N., Alruwaili, M., Alhwaiti, Y., Alshammari, N., & Siddiqi, M. H. “Boosting Breast Cancer Detection Using Convolutional Neural Network.” Journal of Healthcare Engineering, 2021.

18. Wahab, N., & Khan, A. "Multifaceted Fused-CNN Based Scoring of Breast Cancer Whole-Slide Histopathology Images." Applied Soft Computing, 2020, 97, 106808.
19. Hamad, Y. A., Simonov, K., & Naeem, M. B. "Breast Cancer Detection and Classification Using Artificial Neural Networks." In 1st Annual International Conference on Information and Sciences (AiCIS), 2018.