



MODULE TITLE:

Research Methods and Professional Development

**ASSIGNMENT TITLE: Enhancing Forensic Readiness in Multi-Cloud
Environments: A Framework for Secure Evidence Collection and
Compliance**

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Enhancing Forensic Readiness in Multi-Cloud Environments: A Framework for Secure Evidence Collection and Compliance

1. Introduction

1.1 Context and Background

The rapid adoption of cloud computing over the past decade has transformed how organizations store and manage data. Cloud services offer flexibility, scalability, and cost-efficiency, which has made them essential for businesses of all sizes. However, as more organizations move their workloads to the cloud, security challenges have emerged. In particular, the need for forensic readiness in cloud environments has become a critical issue. Cloud forensics refers to the processes, techniques, and frameworks used to gather, preserve, and analyze digital evidence from cloud-based systems in the event of a cyber incident.

One of the key challenges in cloud computing is the shared responsibility model. Cloud service providers (CSPs) such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud are responsible for the security of the underlying infrastructure, while customers are responsible for securing their data, applications, and services hosted on the cloud. This division often results in gaps in security and compliance, as many organizations are not fully aware of their responsibilities in maintaining forensic readiness.

Forensic readiness involves ensuring that an organization's systems and processes are prepared to support a digital forensic investigation when needed. It includes practices such as log management, data integrity assurance, encryption, and evidence preservation. In multi-cloud environments, where organizations use services from multiple CSPs, maintaining forensic readiness becomes even more challenging due to the lack of standardized practices across platforms.

1.2 Research Problem

Problem Statement:

The primary problem addressed in this research is the lack of a comprehensive forensic readiness framework for multi-cloud environments. As organizations continue to adopt multiple cloud platforms, the complexity of managing digital evidence and ensuring regulatory compliance increases. Existing forensic readiness frameworks primarily focus on single-cloud or on-premises environments, leaving multi-cloud environments vulnerable to gaps in evidence collection, preservation, and analysis.

Current Challenges:

- **Data Integrity and Authenticity:** In multi-cloud environments, ensuring the authenticity and integrity of evidence becomes increasingly difficult due to the differing security measures and configurations provided by each cloud provider. Forensic evidence must be immutable and verifiable, which requires robust encryption methods and secure log management practices [1]. However, many cloud services do not provide transparent mechanisms for evidence integrity.
- **Compliance Risks:** Regulatory frameworks like GDPR and ISO/IEC 27037 require strict guidelines for handling digital evidence. In multi-cloud environments, data often resides in multiple jurisdictions, complicating compliance. Compliance with regulations across different cloud platforms is difficult because each provider implements security measures in distinct ways [2]. Failure to comply with these regulations can lead to severe legal and financial consequences.
- **Lack of Integrated Frameworks:** Existing frameworks are often siloed and focus on individual cloud providers. This lack of integration makes it difficult to manage forensic readiness in environments where multiple cloud providers are used simultaneously. The dynamic and decentralized nature of cloud computing further exacerbates this issue, as data is constantly being created, transferred, and deleted across multiple platforms [3].

1.3 Research Aim and Objectives

Aim:

The aim of this research is to develop a comprehensive forensic readiness framework for multi-cloud environments. This framework will focus on enhancing the secure collection, preservation, and analysis of digital evidence while ensuring compliance with regulatory requirements such as GDPR and ISO/IEC 27037.

Objectives:

1. Design a scalable forensic readiness framework that integrates encryption, automated log management, and forensic procedures for multi-cloud environments.
2. Implement the framework in simulated multi-cloud environments (AWS, Azure, Google Cloud) to assess its functionality and performance.
3. Evaluate the framework's performance in terms of evidence collection integrity, completeness, and regulatory compliance.

4. Test the framework's ability to handle dynamic multi-cloud environments, focusing on data security, evidence integrity, and compliance mapping across cloud providers.
5. Propose improvements to existing forensic readiness models by integrating multi-cloud capabilities into the framework.

1.4 Significance of the Research

This research is highly significant because it addresses the growing need for robust forensic readiness in multi-cloud environments. As organizations increasingly adopt multi-cloud strategies, they require a comprehensive framework that ensures secure evidence collection and compliance with regulatory standards. By developing such a framework, this research will provide a solution that enhances organizational security posture, facilitates incident response, and ensures compliance with legal requirements.

Importance:

The outcomes of this research will provide practical solutions for organizations to enhance their forensic readiness in multi-cloud environments. By integrating existing best practices with new techniques tailored for multi-cloud environments, the proposed framework will improve incident response efficiency, reduce the risk of non-compliance, and ensure that evidence collected is legally admissible.

Potential Applications:

The framework developed in this study will have direct applications in industries such as finance, healthcare, and government, where the protection of sensitive data and compliance with regulatory standards are critical. Additionally, the research will contribute to the field of digital forensics by providing a new approach to forensic readiness in cloud environments [1], [2].

2. Literature Review

2.1 Introduction to the Literature Review

The purpose of this literature review is to examine existing research and frameworks related to forensic readiness in cloud environments, focusing on the challenges and solutions in multi-cloud environments. This review will also identify gaps in the current body of knowledge and position the proposed framework within the context of existing research. The scope of the review will include forensic readiness frameworks, compliance regulations, data integrity methods, and multi-cloud security considerations.

2.2 Thematic Organization

A. Cloud Forensics and Forensic Readiness

Cloud forensics is a relatively young but rapidly developing field within digital forensics. Ruan et al. [4] provide an in-depth exploration of the principles of cloud forensics, which includes the identification, collection, and preservation of digital evidence in cloud environments. However, existing cloud forensic frameworks often fail to address the complexity of multi-cloud environments, where data may be distributed across several cloud platforms [1]. This results in challenges such as ensuring data integrity, securing access to evidence, and maintaining compliance with various regulatory frameworks.

B. Forensic readiness in cloud environments is an essential concept that involves preparing cloud systems and processes to support forensic investigations. The National Institute of Standards and Technology (NIST) in its SP 800-86 guide emphasizes the importance of integrating forensic techniques into incident response processes [7]. However, this guide primarily addresses single-cloud environments, and little research has been done on forensic readiness in multi-cloud systems. Therefore, there is a growing need for more specialized frameworks designed to work in these complex environments [6].

C. Frameworks for Forensic Readiness

Several frameworks exist for forensic readiness in cloud environments, including ISO/IEC 27037, which provides guidelines for identifying, collecting, and preserving digital evidence [5]. While these frameworks are helpful for single-cloud environments, they lack a multi-cloud integration model. As cloud providers implement different security measures and protocols, these frameworks must be adapted to ensure seamless evidence collection and preservation across platforms. Alenezi [1] highlights that cloud providers, including AWS, Google Cloud, and Azure, implement distinct logging and security protocols, creating a challenge for consistent forensic practices across cloud platforms.

One of the key challenges identified in the literature is the lack of standardized forensic readiness practices across different cloud providers. AWS, Google Cloud, and Azure each have unique logging, monitoring, and data protection mechanisms, making it difficult to ensure consistent forensic practices across platforms. This gap in the literature highlights the need for an integrated forensic readiness framework that works across multiple cloud platforms [3]. For example, Kaushik and Walsh [3] emphasize the importance of developing

an adaptable forensic framework that can be easily integrated into multi-cloud infrastructures.

D.Data Integrity and Compliance

Maintaining data integrity is a cornerstone of forensic readiness. Without proper encryption and data management practices, evidence can be tampered with, rendering it inadmissible in court. Alenezi [1] argues that encryption and hash functions are critical for ensuring the integrity of forensic evidence. However, multi-cloud environments present challenges in ensuring that evidence is consistently encrypted and protected across different platforms. This complexity is particularly important when evidence is stored across various cloud providers, each with different data protection mechanisms.

Compliance with regulations such as GDPR is another critical aspect of forensic readiness. GDPR requires organizations to implement measures that ensure the confidentiality, integrity, and accessibility of digital evidence [4]. In multi-cloud environments, the challenge lies in ensuring compliance with these regulations across different jurisdictions. Each cloud provider may operate under different legal frameworks, leading to complexity when dealing with data stored in multiple regions. Ruan et al. [4] explain how multi-cloud environments complicate the adherence to international legal and regulatory standards due to the cross-border flow of data.

2.3 Gap in Literature

The current literature on forensic readiness in cloud environments focuses primarily on single-cloud systems, with little attention paid to the complexities of multi-cloud environments. There is a clear gap in the literature regarding how forensic readiness can be achieved across platforms with varying security protocols and compliance requirements. Existing frameworks often fail to account for the need to work across multiple cloud environments, where configurations can change dynamically. Alenezi [1] and Kaushik & Walsh [3] both argue that while cloud forensics is a growing field, significant research is still needed to develop frameworks capable of integrating forensic readiness practices across multi-cloud platforms.

This research aims to fill this gap by providing a comprehensive solution for forensic readiness in multi-cloud environments. It will integrate best practices from existing frameworks, including ISO/IEC 27037 and NIST SP 800-86, while addressing the unique challenges posed by the complexity and diversity of multi-cloud environments.

2.4 Conclusion of Literature Review

The literature review reveals that while forensic readiness in cloud environments is well-established in single-cloud contexts, there is a significant gap in research regarding multi-cloud environments. This research will contribute to filling this gap by developing a new forensic readiness framework that integrates best practices from existing frameworks while addressing the unique challenges posed by multi-cloud environments. It is anticipated that the proposed framework will help streamline forensic processes and ensure compliance across various cloud platforms, making digital evidence collection and preservation more efficient and secure.

3. Research Design and Methodology

3.1 Research Philosophy: Pragmatism

Pragmatism serves as the central philosophy for this research due to its emphasis on practical outcomes, rather than focusing on abstract theoretical considerations. In pragmatic research, the primary concern is developing useful solutions to real-world problems. In this case, the problem is how to enhance forensic readiness in multi-cloud environments. Pragmatism aligns perfectly with the research objectives because it supports the integration of both qualitative and quantitative methods to find actionable solutions to this problem.

The pragmatic approach is particularly suited for this study because it allows for the flexibility to incorporate different perspectives and methods to better address the multifaceted nature of forensic readiness. Cloud forensics, as an emerging field, requires flexible frameworks that adapt to the complexities of multi-cloud environments. Pragmatism also allows the researcher to choose the best methods for gathering evidence, data, and insights, without being confined to any single methodology. Given the technical and organizational challenges in multi-cloud forensic readiness, the use of a pragmatic approach provides a solid foundation for producing real-world, applicable results that have practical value [2].

Pragmatism's flexibility is crucial because it emphasizes the practical application of knowledge. The goal of this research is not merely theoretical development but rather producing a framework that can be used in real-world multi-cloud environments. This means that the outcomes of this research will be directly applicable to organizations looking to enhance their forensic readiness, and the research will involve testing real frameworks in simulated, realistic environments [6].

3.2 Research Approach: Abductive

This study follows an abductive approach, which involves identifying and developing new frameworks based on the analysis of existing theories, practices, and data. Abduction, as defined by philosopher Charles Sanders Peirce, is the process of forming explanatory hypotheses. Unlike deduction, which works from a general premise to a specific conclusion, or induction, which generalizes from specific data to broader principles, abduction starts with an incomplete set of observations and works toward the most plausible explanation.

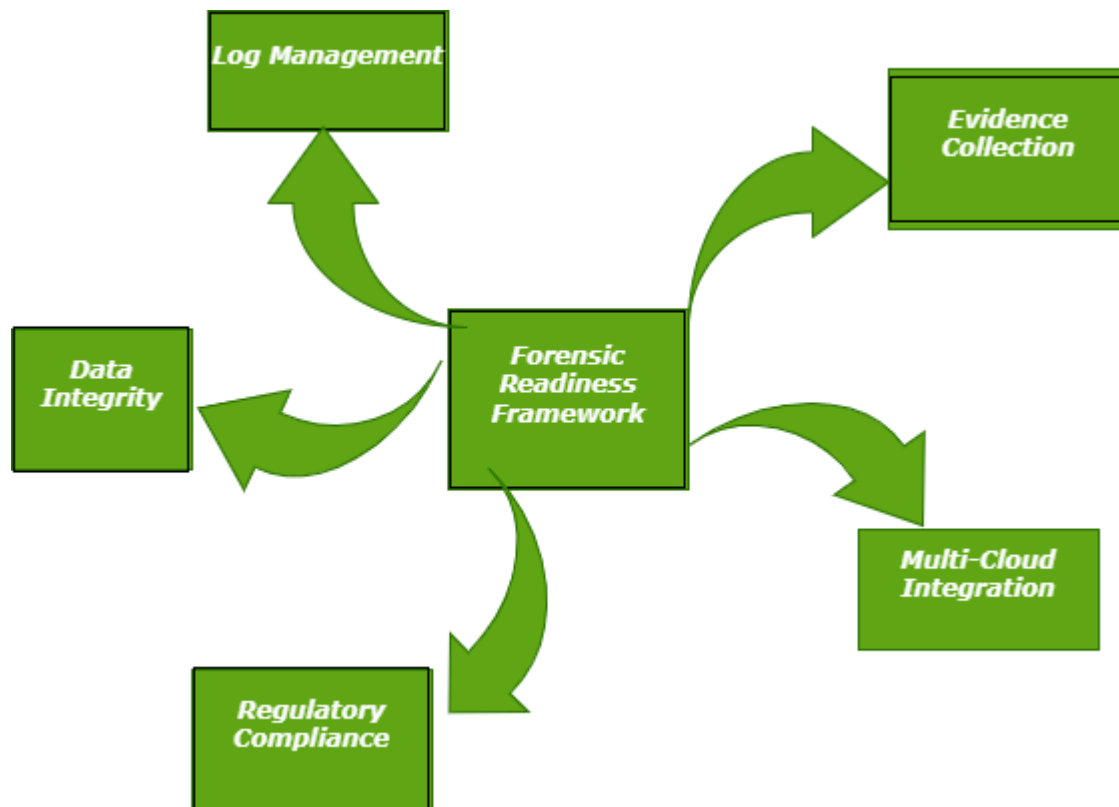
The abduction approach is suitable for this research because the problem—enhancing forensic readiness in multi-cloud environments—is not fully addressed in existing frameworks. Thus, a new framework must be developed. This framework will combine the insights from existing forensic readiness standards (e.g., ISO/IEC 27037, NIST SP 800-86) and cloud security practices, then iteratively refine it through testing and feedback. The process involves generating hypotheses about the best methods for ensuring forensic readiness in multi-cloud environments, followed by empirical testing to validate or refine these hypotheses [3].

In the abductive cycle, the literature review will inform the development of initial hypotheses, which will then be tested in simulated environments. These tests will provide new data,

which will further refine the framework. As such, the research approach emphasizes iterative cycles of theory development, empirical testing, and refinement, with each cycle building on the previous one [4].

3.3 Methodology: Mixed Methods

A mixed-methods approach will be used in this research to strengthen the validity of the results and to ensure a comprehensive understanding of forensic readiness in multi-cloud environments. The combination of quantitative and qualitative methods will provide a holistic view of the effectiveness and practicality of the proposed framework. Mixed-methods research is especially useful when addressing complex issues like multi-cloud environments, which involve both technical components (data collection, preservation, and analysis) and organizational components (compliance, risk management, and policy implementation) [5].



Quantitative Methods:

The quantitative component of the research will focus on testing the framework's performance in terms of **evidence integrity**, **completeness**, and **collection speed**. These aspects are key indicators of forensic readiness, and they will be measured through various metrics. The research will use simulation tools, such as **Wireshark**, **CloudTrail**, and **Volatility**, to simulate evidence collection across multiple cloud platforms (AWS, Google Cloud, and Azure).

The performance of the framework will be assessed using the following key metrics:

- **Data Integrity:** This will be measured by calculating **hash values** of collected data at different stages of the collection process, ensuring that the data remains unchanged from the point of collection until analysis.
- **Evidence Completeness:** The research will evaluate the extent to which all relevant data is captured and preserved in the cloud environment. This will be assessed through the verification of captured data against expected results.
- **Collection Latency:** This metric will assess how quickly evidence is collected from the cloud environment, which is critical for **incident response time**. Faster collection times improve the effectiveness of the forensic process.

These metrics will be assessed under different cloud configurations and in dynamic environments to ensure that the framework can handle variations in cloud infrastructure, such as changes in virtual machines, containers, or storage configurations.

Qualitative Methods:

The qualitative component of the research will involve **semi-structured interviews** with **cybersecurity** and **compliance experts** who work with multi-cloud environments. The purpose of these interviews is to assess the practicality, usability, and organizational alignment of the proposed framework.

The interviews will focus on:

- **Usability of the Framework:** Experts will evaluate whether the framework is easy to integrate into existing systems and whether it simplifies forensic processes in multi-cloud environments.
- **Compliance Alignment:** Experts will assess whether the framework aligns with industry standards such as **GDPR**, **ISO/IEC 27037**, and **NIST SP 800-86**. This is essential for ensuring that the framework is legally and ethically sound.
- **Organizational Readiness:** Experts will provide insights into how the framework fits within the organizational structures of companies that operate in multi-cloud environments. This includes considering factors such as training, policy integration, and resource allocation.

The qualitative data from the interviews will be analyzed using **thematic analysis**, which will identify patterns and themes that emerge from the responses. This analysis will inform further refinements of the forensic readiness framework.

Research Method	Purpose	Tools Used	Data Collected
Quantitative Method	Measure evidence integrity, completeness, and collection speed	Wireshark, CloudTrail, Volatility	Data integrity, hashing results
Qualitative Method	Assess usability and compliance of the framework	Semi-structured interviews with experts	Expert feedback, usability scores
Experimental Case Study	Test the framework across cloud platforms	AWS, Azure, Google Cloud	Performance data, evidence collection

Methodology Overview Table

3.4 Research Strategy: Experimental Case Study

An experimental case study strategy will be employed in this research. The experimental case study allows the researcher to evaluate the effectiveness of the proposed framework in a controlled, simulated multi-cloud environment. By using case studies across different cloud providers (AWS, Azure, Google Cloud), the framework's performance can be tested under various configurations and conditions.

In the case studies, each cloud provider will be simulated with realistic security settings, storage configurations, and compliance requirements. The framework will be deployed in these environments, and the effectiveness of the framework in collecting, preserving, and analyzing forensic evidence will be tested. The case study will focus on key forensic readiness processes:

- **Evidence Identification:** Ensuring that all relevant evidence is identified within the cloud infrastructure.
- **Evidence Collection:** Collecting evidence securely, ensuring data integrity and compliance with regulations.
- **Evidence Preservation:** Ensuring that the collected evidence remains intact and available for analysis throughout the investigation.
- **Compliance Mapping:** Ensuring that all evidence handling complies with relevant regulatory standards, such as **GDPR** and **ISO/IEC 27037**.

Each case study will involve multiple iterations of framework testing to evaluate the performance of evidence collection, security measures, and compliance adherence.

3.5 Time Horizon: Cross-Sectional

A **cross-sectional design** will be used to collect data at a single point in time during the project's duration. This will allow the research to provide an in-depth analysis of the framework's performance in multi-cloud environments without the need for long-term data collection. The timeframe for the study is six months, with the following milestones:

- **Months 1–2:** Literature review and framework design.
- **Months 3–4:** Implementation and testing in simulated environments.
- **Month 5:** Data analysis and expert interviews.
- **Month 6:** Final evaluation, documentation, and submission.

3.6 Tools and Software

To implement and test the proposed framework, the following tools will be used:

- **Wireshark:** A network protocol analyzer for monitoring and capturing network traffic during forensic investigations.
- **Volatility:** A memory forensics tool used to analyze RAM dumps and recover volatile evidence from cloud environments.
- **Python:** A programming language for developing scripts to automate evidence collection and perform data analysis.
- **CloudTrail:** An AWS service that records API calls made on the AWS infrastructure. This will be used for log management and to monitor forensic readiness in cloud environments.
- **Excel:** A tool for data analysis, visualization, and tracking metrics related to evidence integrity, completeness, and collection speed.
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4. Expected Outcome

4.1 Anticipated Results

The primary objective of this research is to develop and evaluate a comprehensive forensic readiness framework that can be effectively implemented in multi-cloud environments. The outcome of this research will significantly contribute to the enhancement of **evidence collection, preservation, and analysis** capabilities within multi-cloud systems while ensuring compliance with critical regulatory standards. The expected results of this study include:

A. Forensic Readiness Framework

The most important anticipated outcome is the development of a scalable, adaptable forensic readiness framework that organizations can implement in multi-cloud environments. This framework will consist of a set of best practices, tools, and protocols designed to enable the secure and compliant collection, preservation, and analysis of digital evidence across different cloud platforms (AWS, Microsoft Azure, and Google Cloud) [1], [4].

The framework will aim to integrate current standards such as ISO/IEC 27037 and NIST SP 800-86, but with specific adaptations that allow it to operate across multiple cloud providers. Additionally, it will support compliance with regulations such as the General Data Protection Regulation (GDPR), Data Protection Act 2018, and industry-specific security standards, while ensuring that the evidence collected is admissible in legal proceedings [5], [6].

This framework will not only enable forensic readiness but also provide organizations with a systematic and standardized way of handling digital evidence within cloud-based environments. By enhancing forensic processes in multi-cloud systems, the framework will improve the effectiveness of incident response, ensure data integrity, and provide a structured method for evidence handling in compliance with both national and international regulations [4].

B. Evidence Integrity and Security

One of the key performance indicators for the success of the framework is its ability to maintain data integrity across multiple cloud platforms. It is anticipated that the proposed forensic readiness framework will provide a robust mechanism for ensuring that digital evidence remains unmodified and secure during the entire lifecycle, from collection through to analysis. This will include the use of encryption, hash functions, and data integrity checks to validate evidence authenticity [3].

It is expected that the framework will ensure that data collected from different cloud providers remains tamper-proof, preserving the integrity of the evidence. This will be particularly important for organizations that operate in regulated industries, where tampering with digital evidence can have serious legal and financial implications [2].

C. Compliance with Regulatory Standards

Another important outcome of this research will be the framework's ability to ensure compliance with various regulatory standards. Given the increasing number of data privacy and security regulations such as GDPR, ISO/IEC 27037, and NIST SP 800-86, organizations face substantial risks if their forensic readiness practices are not in alignment with these standards [5].

It is anticipated that the framework will address key compliance challenges, particularly when it comes to collecting, handling, and storing evidence in multi-cloud environments. The framework will provide a structured approach to ensure that organizations can demonstrate that evidence was handled in accordance with legal requirements and industry standards. This includes automating log management, audit trails, and evidence preservation to ensure that all activities related to forensic investigations are fully documented and traceable [6].

The research also anticipates that the framework will help organizations overcome challenges related to jurisdictional issues in multi-cloud environments. For example, data stored in different geographical locations may be subject to different data protection regulations, and the framework will address how to handle such challenges while maintaining compliance [4].

D. Performance in Multi-Cloud Environments

The empirical testing of the framework will focus on its effectiveness in handling forensic readiness across multiple cloud providers. By simulating real-world scenarios using platforms like AWS, Azure, and Google Cloud, the research expects to evaluate the framework's adaptability in dynamic environments [3].

One of the main performance indicators will be the latency of evidence collection, ensuring that the time between detecting an incident and collecting evidence is minimized. The research also anticipates that the framework will be effective in environments with frequent data provisioning and de-provisioning (e.g., the use of containerized **environments** in the cloud), where traditional forensic methods might face significant challenges [1].

Furthermore, it is anticipated that the framework will work effectively in environments that utilize complex cloud architectures, including distributed systems, serverless functions, and hybrid clouds. The framework should be able to scale with the complexity of cloud infrastructures, ensuring that forensic readiness is maintained even as cloud environments become more dynamic [6].

4.2 Implications

The expected outcomes of this research will have both **practical** and **theoretical** implications that will benefit both industry professionals and the academic community:

A. Practical Implications

From a practical perspective, the development of this forensic readiness framework will significantly improve the incident response capabilities of organizations in multi-cloud environments. Incident response teams will benefit from having a structured, reliable method

for collecting and preserving digital evidence across various cloud platforms. The framework will provide clarity on how to handle forensic data in a compliant manner, which will be particularly useful in high-stakes situations such as data breaches, cyber-attacks, and regulatory audits [1], [6].

Organizations will also be able to reduce the risk of non-compliance, as the framework will be designed to comply with internationally recognized standards, making it easier to demonstrate adherence to regulations during forensic investigations or audits. The framework's automation features—such as automated log collection, data integrity verification, and audit trail generation—will streamline forensic operations, helping organizations save time and resources when responding to incidents [2].

Furthermore, the framework will provide organizations with guidance on how to maintain forensic readiness continuously, not just during an incident, but as part of their overall cybersecurity strategy. By proactively preparing their cloud infrastructure for forensic investigations, organizations will be better positioned to detect and respond to incidents promptly, minimizing the potential damage caused by cyber threats [3].

B. Theoretical Implications

The theoretical contributions of this research will add value to the field of cloud forensics. While there are existing frameworks for forensic readiness in single-cloud environments, multi-cloud environments introduce significant complexity that has not been fully addressed. This research will contribute to cloud forensic theory by developing a comprehensive, multi-cloud forensic readiness framework that integrates existing forensic standards with the evolving needs of organizations operating across multiple cloud platforms [12].

Additionally, this research will expand the understanding of data integrity and compliance challenges in multi-cloud systems. It will also provide insights into how forensic readiness can be adapted to address these challenges in a way that ensures both security and legal compliance [6].

C. Contributions to Forensic Readiness in Cloud Environments

The framework developed in this research will serve as a valuable reference point for future research in the area of cloud forensics. By focusing on multi-cloud environments, this research will fill a gap in the existing body of knowledge, particularly in terms of integrating best practices for evidence collection and compliance across various cloud providers. The framework's adaptability to multiple cloud platforms will also provide a basis for future studies that explore cross-platform forensic techniques and the development of unified forensic protocols for cloud environments [11], [5].

4.3 Limitations

While the research is expected to make significant contributions, several limitations should be acknowledged:

A. Scalability Challenges

Although the framework will be tested in simulated environments, the scalability of the

framework in large-scale, real-world environments could present unforeseen challenges. Cloud environments are increasingly dynamic, and the complexity of large-scale infrastructures may require further refinement of the framework to ensure it remains effective at scale [3].

B. Cloud-Specific Limitations

The research will focus on the three major cloud providers (AWS, Azure, and Google Cloud), but there are numerous other providers in the market, each with different security protocols and data management practices. While the framework will be designed to be adaptable, further work may be needed to extend it to other cloud platforms and assess its effectiveness in such environments [9].

C. Resource Constraints

Testing the framework in a real-world, large-scale cloud environment could be limited by the resources available for the research. While the simulated environments will provide valuable insights, they may not fully capture the complexities of high-traffic, enterprise-level cloud infrastructures [5].

D. Legal and Jurisdictional Issues

Another limitation is the legal and jurisdictional complexities involved in multi-cloud forensics. For example, data sovereignty laws differ across countries and regions, and evidence handling in one jurisdiction might not be legally applicable in another. While the framework will account for compliance with international standards, it may not fully address all the nuances of jurisdictional law in a multi-cloud environment [8], [6].

5. Timeline

Here is a realistic project timeline, broken down by month over a 6-month period (since your plan indicated a six-month completion window). Major tasks and milestones are included. You can convert this into a table or Gantt-chart for your final submission. This timeline ensures coverage of all proposal steps: design, implementation, evaluation, and final write-up.

Project Timeline (6-Month Plan)

Period	Milestones / Tasks	Deliverables / Outputs
Month 1-2	Finalize research questions, conduct literature review, draft framework design	Literature review summary, conceptual model draft
End Month 2	Complete literature review and framework design	Literature review & framework design document
Month 3	Set up multi-cloud environments (AWS, Azure, Google Cloud), configure security	Configured multi-cloud test-beds, evidence collection tools
-Mid Month 3	Ensure environments are ready for testing	Environment setup report
Month 4	Execute initial tests, collect data on evidence collection and integrity	Raw data sets, interview plan
End Month 4	Complete first tests and pilot framework evaluation	Pilot test report with quantitative results
Month 5	Analyze results, conduct interviews, refine the framework	Data analysis sheets, revised framework documentation
Mid Month 5	Finalize framework and prepare for further testing	Refined framework documentation
Month 6	Final evaluation and re-run tests in multi-cloud environments	Full draft of research report, results, and finalized framework
End Month 6	Submit final report with all relevant documents	Completed research report, ethics form, references

Notes / Buffer Time

- Within each month, build in 10–15% buffer time for delays (e.g. cloud configuration issues, scheduling expert interviews, unexpected testing failures). This is a good practice in project planning. [Oxbridge Essays+1](#)
 - If certain tasks overlap (e.g. data analysis of one cloud platform while testing another), allocate time properly to avoid resource bottlenecks.
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6. Overall Presentation of the Proposal — Structuring & Style Tips

To ensure your proposal meets academic standards and is easy to follow, pay attention to the following presentation and structural aspects:

- **Clear, Consistent Structure:** Use the headings as specified (Introduction; Literature Review; Methodology; Expected Outcome; Timeline; References). This helps readability and ensures markers can follow your logic. Many universities expect this style. [University of Gloucestershire+1](#)
 - **Concise Writing + Clarity:** Even though your full proposal is long, each section should be well-structured, avoid unnecessary jargon, and provide clear explanations.
 - **Use Tables or Charts for Timeline:** As recommended by academic writing guides, a Gantt-chart (or at least a tabular timeline) makes your timeline easier to digest. [Westminster University LibGuides+1](#)
 - **Proper Citations & Reference Style:** Use a standard citation style (e.g. APA, Harvard, IEEE) consistently. Every source cited in text should appear in the References list.
 - **Professional Presentation:** Use formatting (consistent headings, font sizes, spacing), a title page, page numbers, and clean layout. Proofread carefully for grammar/spelling errors. Many guides note that this helps signal seriousness and clarity. [University of Gloucestershire+1](#)
 - **Feasibility & Realism:** The timeline and methodology should reflect what is realistically achievable within your timeframe (6 months). Overly ambitious plans can decrease credibility. Writing a timeline with realistic milestones helps show feasibility. [gs.emory.edu+1](#)
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