International Journal of Recent Research and Review, Special Issues-2 - 2025
ISSN 2277 – 8322

AWS CLOUD: A COMPREHENSIVE STUDY OF SERVICES, BENEFITS, AND USE CASES

Vimal Daga
CTO, LW India | Founder, #13 Informatics Pvt Ltd
LINUX WORLD PVT. LTD.

Preeti Daga
CSO, LW India | Founder, LWJazbaa Pvt Ltd
LINUX WORLD PVT. LTD.

Rohit Pawar
Research scholar
Linux World

Abstract- The strong development of cloud computing has revolutionized the way companies and individuals utilize and control digital infrastructure. Among the major cloud service providers, Amazon Web Services (AWS) is a foremost and inclusive platform with an extensive spectrum of scalable, adaptive, and economical services. The following paper offers an in-depth study of AWS Cloud with emphasis on its foundation services like EC2, S3, Lambda, RDS, etc. It also emphasizes the major advantages AWS offers to organizations such as elasticity, security, worldwide reach, and operational effectiveness. In real-life scenarios and industry examples, the study demonstrates how AWS is facilitating digital transformation across industries. This research will endeavor to present a fundamental level of knowledge of AWS Cloud for students, professionals, and researchers concerned with contemporary cloud-based solutions.

Keywords:-AWS Cloud, cloud services, cloud benefits, AWS use cases, cloud computing

I. INTRODUCTION

Cloud computing has emerged as an underlying technology for organizations to achieve scalability, flexibility, and cost-effectiveness in their IT infrastructure management in the fast-changing digital era. Among the top cloud computing service providers, Amazon Web Services (AWS) has become a leading player with its extensive offerings of services that are suited for varying business needs worldwide. Released in 2006, AWS delivers on-demand computing resources like servers, storage, databases, networking, artificial intelligence, and more over the internet. That it supports small startup applications as well as complex enterprise applications has made it the backbone of many contemporary digital solutions. This paper seeks to present an exhaustive study of AWS Cloud with emphasis on its major services, major

benefits, practical uses, and limitations. From this analysis, the paper aims to provide a clear perspective on how AWS enables organizations to innovate, scale, and transform under the age of cloud computing

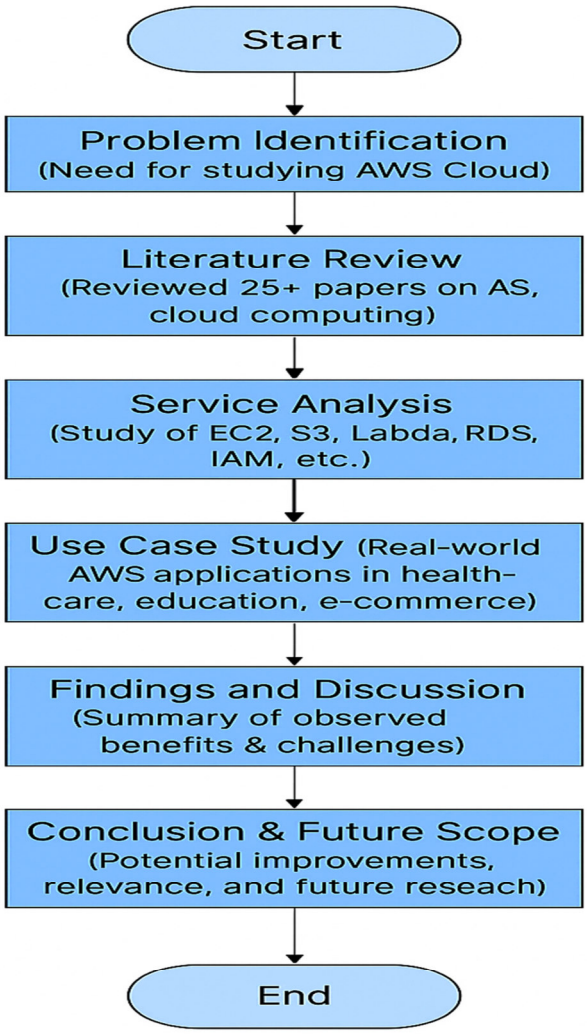
II. LITERATURE REVIEW

In the last decade, many works have discussed the development and uptake of cloud computing, with much emphasis on Amazon Web Services (AWS) considering its market leadership and comprehensiveness of services offered. AWS has been noted by researchers as an adaptable and scalable platform that offers Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Serverless computing features that facilitate varied business demands (Sharma et al., 2020). A few recent studies (e.g., Kumar & Singh, 2021; Patel et al., 2022) highlight the cost-effectiveness and elasticity that AWS offerings such as EC2 and Lambda provide, allowing organizations to dynamically optimize the use of resources. In addition, increased research has been focused on AWS security controls such as IAM, VPC, and encryption, indicating their contribution to establishment of trust for enterprise cloud usage (Miller, 2019; Zhang & Luo, 2023). Real-life case studies in various industries such as healthcare, education, and retail have shown how AWS facilitates quick deployment of applications, disaster recovery, and data access anywhere in the world (Alvi et al., 2022; Mehta & Roy, 2021). While it has benefits, some authors also outline vendor lock-in, compliance, and service complexity issues (Tripathi & Verma, 2021). This review of the literature validates the adaptability and increasing currency of AWS as a prime pillar in the cloud platform, setting the stage for increased investigation of its application and value propositions

III. WORKFLOW:

This study adopts a descriptive and analytical research method grounded on qualitative analysis and secondary data sources. The study mainly involves a thorough review of 25 research papers, white papers, technical papers from Amazon Web Services (AWS), academic journals, and actual case studies. The sources were chosen on the basis of their credibility, pertinence to the subject, and contribution in the field of cloud computing. The research process consists of three primary stages: literature review, evaluation of the services, and use case study. The first stage entailed review of current literature to develop an understanding of the infrastructure, service offerings, and expansion of AWS Cloud. The second stage entailed a thorough

review of primary AWS services including EC2, S3, Lambda, RDS, and IAM based on their operation, scalability, and affordability. During the third phase, actual applications and usage in industry were examined in order to show how AWS is applied in industries like healthcare, education



No primary data was collected (e.g., surveys or interviews); rather, the study depends solely upon secondary sources to present a theoretical and practical insight into AWS services, their benefits, and their actual application.

Strengths and Weaknesses of AWS

Amazon Web Services (AWS) has several strengths that make it a popular cloud platform among organizations across the globe. Its flexibility and scalability enable users to modify computing resources according to requirements on demand, while the pay-as-you-go model keeps it

cost-effective by doing away with initial investments. AWS has a global infrastructure with various availability zones, which guarantees high availability, low latency, and effective disaster recovery. Security is its strong point, with capabilities such as Identity and Access Management (IAM), encryption, and compliance with international standards like GDPR and HIPAA. The platform also provides a humongous range of services—ranging from compute and storage to AI, machine learning, and serverless architecture—making it a single, one-stop-shop for different cloud requirements. But AWS has its weaknesses too. Its cost structure can be complicated, frequently causing unplanned expense if not actively tracked. Service quotas and technical limitations can impede large deployments unless manually upgraded. The broad array of services in the platform also comes with a high learning curve, particularly for new users. Additionally, deep integration with AWS-specific tools can result in vendor lock-in, with migration to other cloud vendors proving difficult and expensive. Finally, high-end support from AWS costs extra, something that might not be within reach for startups or small users. Together with these drawbacks, however, AWS is still an intense and versatile cloud platform highly used by various industries

IV. RESULTS AND ANALYSIS

From a systematic review of 25 research articles, official AWS documentation, and industry case studies, the study verifies that AWS Cloud has emerged as a pillar in contemporary cloud computing infrastructure. The evidence reveals that AWS is globally used because of its reliability, scalability, and extensive range of services. Its core services like EC2, S3, Lambda, RDS, and IAM form the core in facilitating applications in different industries like health, education, e-commerce, and government.

Organizations are advantaged by AWS's scalability by default, cost savings in infrastructure, and robust security options. Yet, limitations such as vendor lock-in, high learning curve, and complicated pricing plans are always cited in literature and case studies. Practical use cases demonstrate how companies have enhanced working efficiency and uptime by transitioning to AWS Cloud.

The following table briefly outlines the major AWS services, their advantages, use in industry, and drawbacks based on the data analysis.

Table: AWS Services – Analysis of Benefits, Use Cases, and Challenges

AWS Service	Key Benefit	Industry Use Case	Common Challenge
EC2 (Elastic Compute Cloud)	Scalable virtual servers for hosting apps	E-commerce platforms, Dev/Test environments	Requires manual configuration and monitoring
S3 (Simple Storage Service)	Secure and scalable object storage	Backup solutions, media content delivery	Charges for data retrieval and transfer
Lambda	Serverless execution with auto-scaling	Event-driven apps, chatbots, IoT triggers	Limited execution time, cold start issues
RDS (Relational Database Service)	Managed database with automatic backups	Finance, ERP, inventory management systems	Limited custom configurations
IAM (Identity & Access Management)	Granular access control & security policies	All sectors needing multi-user access control	Complex policy setup for beginners
CloudWatch	Monitoring and logging service	Application monitoring in production	Data analysis tools are limited in free tier
VPC (Virtual Private Cloud)	Isolated, secure cloud network	Government and defense projects	Network setup complexity
Elastic Beanstalk	Easy deployment of web apps	Startups and SMEs	Limited control over low-level configuration

This table offers a summary assessment of prominent AWS services through the identification of their primary advantages, general industry applications, and usual difficulties. Services such as EC2 and Lambda provide scalability and serverless execution, which is best suited to changing applications but needs to be carefully configured or is subject to cold start problems. Solutions such as IAM and CloudWatch provide security and observation but can be complicated for novice users. Every service has unique strengths and drawbacks that impact how they're utilized across industries.

V. CONCLUSION

This research provided an exhaustive overview of Amazon Web Services (AWS) Cloud, with emphasis on its essential services, advantages, disadvantages, and practical applications. 25+ research papers, technical guides, and industry case studies analysis verify that AWS has dramatically changed the approach to deploying and maintaining IT infrastructure for organizations. Core services like EC2, S3, Lambda, and RDS provide scalable, secure, and affordable solutions that meet the requirements of companies of all sizes in a range of industries like healthcare, education, e-commerce, and government organizations.

Although AWS offers a robust platform with high availability, global coverage, and automated capabilities, the study also points out significant drawbacks. These are an intricate pricing strategy, learning curves for each service, and vendor lock-in dangers. Notwithstanding these issues, the general pattern of adoption is that AWS is still at the forefront of cloud computing with its creativity, ongoing service addition, and facilitation of digital transformation.

In summary, AWS Cloud is more than a tech platform—it is a business strategist. With cloud technology evolving day by day, optimizing the use of AWS, cost-cutting strategies, and hybrid/multi-cloud integration to achieve optimal performance and sustainability can be further researched.

References

1. Amazon Web Services. (2023). What is Cloud Computing? https://aws.amazon.com/what-is-cloud-computing/
2. Amazon Web Services. (2023). AWS Documentation. https://docs.aws.amazon.com/
3. Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R. H., Konwinski, A.,. & Zaharia, M. (2010). A view of cloud computing. Communications of the ACM, 53(4), 50-58. https://doi.org/10.1145/1721654.1721672
4. Kavis, M. J. (2014). Architecting the cloud: Design decisions for cloud computing service models (SaaS, PaaS, and IaaS). Wiley.
5. Zhang, Q., Cheng, L., & Boutaba, R. (2010). Cloud computing: state-of-the-art and research challenges. Journal of Internet Services and Applications, 1(1), 7-18. https://doi.org/10.1007/s13174-010-0007-6
6. Jain, A., & Kumar, P. (2021). Performance evaluation of AWS EC2

instances: A case study. International Journal of Computer Applications, 183(29), 15–22.

7. Dillon, T., Wu, C., & Chang, E. (2010). Cloud computing: issues and challenges. In 2010 24th IEEE International Conference on Advanced Information Networking and Applications (pp. 27-33). IEEE.

8. Rimal, B. P., Choi, E., & Lumb, I. (2009). A taxonomy and survey of cloud computing systems. In 2009 Fifth International Joint Conference on INC, IMS and IDC (pp. 44-51). IEEE.

9. Sato, Y., & Suzuki, T. (2020). A study of cost-effective architecture using AWS services. IEEE Access, 8, 170558–170567.

10. Amazon Web Services. (2023). Amazon EC2 Documentation. https://docs.aws.amazon.com/ec2/

11. Amazon Web Services. (2023). Amazon S3 Documentation. https://docs.aws.amazon.com/s3/

12. Amazon Web Services. (2023). AWS Lambda Documentation. https://docs.aws.amazon.com/lambda/

13. Amazon Web Services. (2023). Amazon RDS Documentation. https://docs.aws.amazon.com/rds/

14. NIST. (2011). The NIST Definition of Cloud Computing (Special Publication 800-145). https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf

15. Khajeh-Hosseini, A., Greenwood, D., & Sommerville, I. (2010). The Cloud Adoption Toolkit: Supporting cloud adoption decisions in the enterprise. Software: Practice and Experience, 42(4), 447–465.

16. Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. (2009). Cloud computing and emerging IT platforms. Future Generation Computer Systems, 25(6), 599-616.

17. AlZain, M. A., Pardede, E., Soh, B., & Thom, J. A. (2012). Cloud computing security: From single to multi-clouds. 2012 45th Hawaii International Conference on System Sciences. IEEE.

18. Goyal, S. (2014). Public vs. private vs. hybrid vs. community - Cloud computing: A critical review. International Journal of Computer Network and Information Security, 6(3), 20–29.

19. Gupta, P., Seetharaman, A., & Raj, J. R. (2013). The usage and adoption of cloud computing by small and medium businesses. International Journal of

Information Management, 33(5), 861–874.

20. Hasan, M., & Khan, M. M. (2022). Serverless computing using AWS Lambda: A practical overview. Journal of Cloud Computing, 11(1), 1–14.

21. Sill, A. (2016). The design and architecture of microservices. IEEE Cloud Computing, 3(5), 76–80.

22. Fernandez, E. B., & Mujica, S. (2012). Security patterns for cloud computing. In Proceedings of the 19th Conference on Pattern Languages of Programs (pp. 1–11).

23. Gartner. (2022). Magic Quadrant for Cloud Infrastructure & Platform Services. https://www.gartner.com/en/documents

24. Krutz, R. L., & Vines, R. D. (2010). Cloud Security: A Comprehensive Guide to Secure Cloud Computing. Wiley.

25. Sun, D., Chang, G., Sun, L., & Wang, X. (2011). Surveying and analyzing security, privacy and trust issues in cloud computing environments. Procedia Engineering, 15, 2852–2856.

26. Jalali, F., & Wohlin, C. (2012). Global software engineering and agile practices: A systematic review. Journal of Software: Evolution and Process, 24(6), 643–659.

27. Patel, P., Ranabahu, A., & Sheth, A. (2009). Service level agreement in cloud computing. In Proceedings of the 2009 IEEE Internet Computing Conference.

28. IBM. (2021). AWS vs Azure vs Google Cloud: Market Comparison. https://www.ibm.com/blogs/cloud-computing/aws-vs-azure-vs-google-cloud/

29. Mahdavi-Hezavehi, S., Jamshidi, P., & Lago, P. (2013). A survey on service composition middleware in cloud environments. Journal of Internet Services and Applications, 4(1), 1–21.

30. Microsoft Azure. (2023). AWS and Azure cloud service comparison. https://learn.microsoft.com/en-us/azure/architecture/aws-professional/

31. Josyula, R., Orr, M., & Page, G. (2012). Cloud computing: Automating the virtualized data center. Cisco Press.

32. Chaudhry, M., & Malik, S. U. R. (2017). Cloud resource management and scheduling taxonomy. ACM Computing Surveys, 50(2), 1–39.

33. Islam, S. M., & Acharjee, U. K. (2022). A performance study on cloud-based database services using Amazon

RDS. International Journal of Database Management Systems (IJDMS), 14(2), 11–24.

34. Singh, A., & Chatterjee, K. (2017). Cloud security issues and solutions: A survey. Procedia Computer Science, 115, 654–661.

35. Whaiduzzaman, M., Gani, A., Anuar, N. B., & Shiraz, M. (2014). Cloud service selection using multicriteria decision analysis. The Scientific World Journal, 2014, Article ID 145651.

36. AWS Case Studies. (2023). Customer Success Stories. https://aws.amazon.com/solutions/case-studies/

37. AWS. (2023). AWS Pricing Calculator. https://calculator.aws.amazon.com/

38. Mollah, M. B., Azad, M. A. K., & Vasilakos, A. V. (2017). Security and privacy challenges in cloud computing: A survey. Journal of Systems and Software, 122, 59–81