## REFERENCES


[1] M. Mclemore, "Netflix uses nice dcv on aws to build vfx studio in the cloud for artists globally," 2021. [Online]. Available: https://youtu.be/FSnM6KIvIN0

[2] A. Medina, "Google cloud platform outage analysis," Jun 2019. [Online]. Available: https://www.thousandeyes.com/blog/google-cloud-platform-outage-analysis?utm_source=Blog&utm_medium=Textlink&utm_campaign=looking-back-biggest-internet-outages-2019

[3] C. Cervantes, C. Villemez, and R. Rosas, "Aws outage analysis: July 28, 2022," Aug 2022. [Online]. Available: https://www.thousandeyes.com/blog/aws-outage-analysis-july-28-2022

[4] S. Khan, I. Kabanov, Y. Hua, and S. Madnick, "A systematic analysis of the capital one data breach: Critical lessons learned," *ACM Transactions on Privacy and Security*, vol. 26, no. 1, pp. 1–29, 2022.

[5] O. f. C. R. (OCR), "Hipaa for professionals," Jul 2024. [Online]. Available: https://www.hhs.gov/hipaa/for-professionals/index.html

[6] O. J. European Union, "Regulation - 2016/679 - en - gdpr - eur-lex," 2016. [Online]. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R0679

[7] P. Wang, C. Zhao, and Z. Zhang, "An ant colony algorithm-based approach for cost-effective data hosting with high availability in multi-cloud environments," in *2018 IEEE 15th International Conference on Networking, Sensing and Control (ICNSC)*. IEEE, 2018, pp. 1–6.

[8] A. Web Servers, "Amazon s3 - cloud object storage - aws," 2023. [Online]. Available: https://aws.amazon.com/s3/

[9] Microsoft, "Azure blob storage," 2023. [Online]. Available: https://azure.microsoft.com/en-us/products/storage/blobs/

[10] J. George, "Optimizing hybrid and multi-cloud architectures for real-time data streaming and analytics: Strategies for scalability and integration," *World Journal of Advanced Engineering Technology and Sciences*, vol. 7, no. 1, pp. 10–30 574, 2022.

[11] R. Kaur, I. Chana, and J. Bhattacharya, "Data deduplication techniques for efficient cloud storage management: a systematic review," *The Journal of Supercomputing*, vol. 74, pp. 2035–2085, 2018.

[12] M. Su, L. Zhang, Y. Wu, K. Chen, and K. Li, "Systematic data placement optimization in multi-cloud storage for complex requirements," *IEEE Transactions on Computers*, vol. 65, no. 6, pp. 1964–1977, 2015.

[13] Y. Singh, F. Kandah, and W. Zhang, "A secured cost-effective multi-cloud storage in cloud computing," in *2011 IEEE conference on computer communications workshops (INFOCOM WKSHPS)*. IEEE, 2011, pp. 619–624.

[14] L. Globa and A. Kartashov, "Optimizing distributed data storage in multi-cloud environments: Algorithmic approach," *Information and Telecommunication Sciences*, no. 2, pp. 4–12, 2024.

[15] P. R. Naidu, N. Guruprasad, and V. D. Gowda, "A high-availability and integrity layer for cloud storage, cloud computing security: from single to multi-clouds," in *Journal of Physics: Conference Series*, vol. 1921, no. 1. IOP Publishing, 2021, p. 012072.

[16] D. Dobre, P. Viotti, and M. Vukolić, "Hybris: Robust hybrid cloud storage," in *Proceedings of the ACM Symposium on Cloud Computing*, 2014, pp. 1–14.

[17] G. Tricomi, G. Merlino, A. Panarello, and A. Puliafito, "Optimal selection techniques for cloud service providers," *IEEE Access*, vol. 8, pp. 203 591–203 618, 2020.

[18] A. Pietrabissa, F. D. Priscoli, A. Di Giorgio, A. Giuseppi, M. Panfili, and V. Suraci, "An approximate dynamic programming approach to resource management in multi-cloud scenarios," *International Journal of Control*, vol. 90, no. 3, pp. 492–503, 2017.

[19] Y. Aldwyan and R. O. Sinnott, "Latency-aware failover strategies for containerized web applications in distributed clouds," *Future Generation Computer Systems*, vol. 101, pp. 1081–1095, 2019.

[20] S. He, Y. Wang, Z. Li, X.-H. Sun, and C. Xu, "Cost-aware region-level data placement in multi-tiered parallel i/o systems," *IEEE Transactions on Parallel and Distributed Systems*, vol. 28, no. 7, pp. 1853–1865, 2016.

[21] H. Weatherspoon and J. D. Kubiatowicz, "Erasure coding vs. replication: A quantitative comparison," in *International Workshop on Peer-to-Peer Systems*. Springer, 2002, pp. 328–337.

[22] V. Guruswami and M. Wootters, "Repairing reed-solomon codes," in *Proceedings of the forty-eighth annual ACM symposium on Theory of Computing*, 2016, pp. 216–226.

[23] C. Huang, J. Li, and M. Chen, “On optimizing xor-based codes for fault-tolerant storage applications,” in *2007 IEEE Information Theory Workshop*. IEEE, 2007, pp. 218–223.

[24] D. S. Papailiopoulos and A. G. Dimakis, “Locally repairable codes,” *IEEE Transactions on Information Theory*, vol. 60, no. 10, pp. 5843–5855, 2014.

[25] S. B. Wicker and V. K. Bhargava, “An introduction to reed-solomon codes,” *Reed-Solomon codes and their applications*, pp. 1–16, 1994.

[26] Z. Shen, Y. Cai, K. Cheng, P. P. Lee, X. Li, Y. Hu, and J. Shu, “A survey of the past, present, and future of erasure coding for storage systems,” *ACM Transactions on Storage*, 2024.

[27] W. Song and C. Yuen, “Locally repairable codes with functional repair and multiple erasure tolerance,” *arXiv preprint arXiv:1507.02796*, 2015.

[28] A. Chiniah and A. Mungur, “On the adoption of erasure code for cloud storage by major distributed storage systems,” *EAI Endorsed Transactions on Cloud Systems*, vol. 7, no. 21, pp. e1–e1, 2022.

[29] H. Abu-Libdeh, L. Princehouse, and H. Weatherspoon, “Racs: a case for cloud storage diversity,” in *Proceedings of the 1st ACM symposium on Cloud computing*, 2010, pp. 229–240.

[30] T. G. Papaioannou, N. Bonvin, and K. Aberer, “Scalia: An adaptive scheme for efficient multi-cloud storage,” in *SC’12: Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis*. IEEE, 2012, pp. 1–10.

[31] E. Weintraub and Y. Cohen, “Multi objective optimization of cloud computing services for consumers,” *International Journal of Advanced Computer Science and Applications*, vol. 8, no. 2, 2017.

[32] K. RahimiZadeh, M. AnaLoui, P. Kabiri, and B. Javadi, “Workload-aware placement of multi-tier applications in virtualized datacenters,” *The Computer Journal*, vol. 60, no. 2, pp. 210–239, 2017.

[33] J. Zhou, J. Fan, J. Jia, B. Cheng, and Z. Liu, “Optimizing cost for geo-distributed storage systems in online social networks,” *Journal of computational science*, vol. 26, pp. 363–374, 2018.

[34] P. Wang, C. Zhao, W. Liu, Z. Chen, and Z. Zhang, “Optimizing data placement for cost effective and high available multi-cloud storage,” *Computing and Informatics*, vol. 39, no. 1-2, pp. 51–82, 2020.

[35] C. Georgios, F. Evangelia, M. Christos, and N. Maria, "Exploring cost-efficient bundling in a multi-cloud environment," *Simulation Modelling Practice and Theory*, vol. 111, p. 102338, 2021. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1569190X2100054X

[36] Q. Wei, B. Veeravalli, B. Gong, L. Zeng, and D. Feng, "Cdrm: A cost-effective dynamic replication management scheme for cloud storage cluster," in *2010 IEEE international conference on cluster computing*. IEEE, 2010, pp. 188–196.

[37] D. Ford, F. Labelle, F. I. Popovici, M. Stokely, V.-A. Truong, L. Barroso, C. Grimes, and S. Quinlan, "Availability in globally distributed storage systems," in *9th USENIX Symposium on Operating Systems Design and Implementation (OSDI 10)*, 2010.

[38] Y. Mansouri, A. N. Toosi, and R. Buyya, "Brokering algorithms for optimizing the availability and cost of cloud storage services," in *2013 IEEE 5th International Conference on Cloud Computing Technology and Science*, vol. 1. IEEE, 2013, pp. 581–589.

[39] E. Bauer, R. Adams, and D. Eustace, *Beyond redundancy: how geographic redundancy can improve service availability and reliability of computer-based systems*. John Wiley & Sons, 2011.

[40] P. T. Endo, M. Rodrigues, G. E. Gonçalves, J. Kelner, D. H. Sadok, and C. Curescu, "High availability in clouds: systematic review and research challenges," *Journal of Cloud Computing*, vol. 5, pp. 1–15, 2016.

[41] L. Gupta, R. Jain, M. Samaka, A. Erbad, and D. Bhamare, "Performance evaluation of multi-cloud management and control systems," *Recent Advances in Communications and Networking Technology (Formerly Recent Patents on Telecommunication)(Discontinued)*, vol. 5, no. 1, pp. 9–18, 2016.

[42] A. Suzuki, M. Kobayashi, and E. Oki, "Multi-agent deep reinforcement learning for cooperative computing offloading and route optimization in multi cloud-edge networks," *IEEE Transactions on Network and Service Management*, vol. 20, no. 4, pp. 4416–4434, 2023.

[43] N. Delessy, E. B. Fernandez, M. M. Larrondo-Petrie, and J. Wu, "Patterns for access control in distributed systems," in *Proceedings of the 14th Conference on Pattern Languages of Programs*, 2007, pp. 1–11.

[44] S. Zaheer, A. W. Malik, A. U. Rahman, and S. A. Khan, "Locality-aware process placement for parallel and distributed simulation in cloud data centers," *The Journal of Supercomputing*, vol. 75, no. 11, pp. 7723–7745, 2019.

[45] T. Alyas, T. M. Ghazal, B. S. Alfurhood, G. F. Issa, O. A. Thawabeh, and Q. Abbas, "Optimizing resource allocation framework for multi-cloud environment." *Computers, Materials & Continua*, vol. 75, no. 2, 2023.

[46] Z. Li, C. Jin, T. Xu, C. Wilson, Y. Liu, L. Cheng, Y. Liu, Y. Dai, and Z.-L. Zhang, "Towards network-level efficiency for cloud storage services," in *Proceedings of the 2014 Conference on Internet Measurement Conference*, 2014, pp. 115–128.

[47] Q. H. Vu, M. Colombo, R. Asal, A. Sajjad, F. A. El-Moussa, and T. Dimitrakos, "Secure cloud storage: a framework for data protection as a service in the multi-cloud environment," in *2015 IEEE Conference on Communications and Network Security (CNS)*. IEEE, 2015, pp. 638–642.

[48] A. Rafique, D. Van Landuyt, E. H. Beni, B. Lagaisse, and W. Joosen, "Cryptdice: Distributed data protection system for secure cloud data storage and computation," *Information Systems*, vol. 96, p. 101671, 2021.

[49] K. A. Torkura, M. I. Sukmana, F. Cheng, and C. Meinel, "Continuous auditing and threat detection in multi-cloud infrastructure," *Computers & Security*, vol. 102, p. 102124, 2021.

[50] S. Mehraj and M. T. Banday, "Establishing a zero trust strategy in cloud computing environment," in *2020 International Conference on Computer Communication and Informatics (ICCCI)*. IEEE, 2020, pp. 1–6.

[51] D. Stutz, J. T. de Assis, A. A. Laghari, A. A. Khan, N. Andreopoulos, A. Terziev, A. Deshpande, D. Kulkarni, and E. G. Grata, "Enhancing security in cloud computing using artificial intelligence (ai)," *Applying Artificial Intelligence in Cybersecurity Analytics and Cyber Threat Detection*, pp. 179–220, 2024.

[52] A. Bhattarai, "Ai-enhanced cloud computing: Comprehensive review of resource management, fault tolerance, and security," *Emerging Trends in Machine Intelligence and Big Data*, vol. 15, pp. 39–50.

[53] H. N. S. Aldin, H. Deldari, M. H. Moattar, and M. R. Ghods, "Consistency models in distributed systems: A survey on definitions, disciplines, challenges and applications," *arXiv preprint arXiv:1902.03305*, 2019.

[54] O. A. Kozina, V. I. Panchenko, O. V. Kolomiitsev, V. V. Usik, N. K. Stratiienko, L. V. Safoshkina, and Y. F. Kucherenko, "Data consistency protocol for multi-cloud systems," *International Journal of Cloud Computing*, vol. 13, no. 1, pp. 42–61, 2024.

[55] N. Mhaisen and Q. M. Malluhi, "Data consistency in multi-cloud storage systems with passive servers and non-communicating clients," *IEEE Access*, vol. 8, pp. 164 977–164 986, 2020.

[56] T. Junfeng, B. Wenqing, and J. Haoyi, "Pgce: A distributed storage causal consistency model based on partial geo-replication and cloud-edge collaboration architecture," *Computer Networks*, vol. 212, p. 109065, 2022.

[57] M. Raynal, "About logical clocks for distributed systems," *ACM SIGOPS Operating Systems Review*, vol. 26, no. 1, pp. 41–48, 1992.

[58] L. Lamport, "Time, clocks, and the ordering of events in a distributed system," in *Concurrency: the Works of Leslie Lamport*, 2019, pp. 179–196.

[59] ——, "Paxos made simple," *ACM SIGACT News (Distributed Computing Column) 32, 4 (Whole Number 121, December 2001)*, pp. 51–58, 2001.

[60] Y. Zhang, B. Han, Z.-L. Zhang, and V. Gopalakrishnan, "Network-assisted raft consensus algorithm," in *Proceedings of the SIGCOMM Posters and Demos*, 2017, pp. 94–96.

[61] H. Wada, A. D. Fekete, L. Zhao, K. Lee, and A. Liu, "Data consistency properties and the trade-offs in commercial cloud storage: the consumers' perspective." in *CIDR*, vol. 11, 2011, pp. 134–143.

[62] B. Ferzo and S. R. Zeebaree, "Distributed transactions in cloud computing: A review reliability and consistency," *The Indonesian Journal of Computer Science*, vol. 13, no. 3, 2024.

[63] M. Perrin, A. Mostefaoui, and C. Jard, "Causal consistency: beyond memory," in *Proceedings of the 21st ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, 2016, pp. 1–12.

[64] M. S. Z. Nine and T. Kosar, "A two-phase dynamic throughput optimization model for big data transfers," *IEEE Transactions on Parallel and Distributed Systems*, vol. 32, no. 2, pp. 269–280, 2020.

[65] J. Sun, "Dynamic adaptation for distributed systems." Ph.D. dissertation, Graduate University for Advanced Studies, Japan, 2016.

[66] I. Hristova, "Optimizing cloud data management with ai-driven solutions," in *Conferences of the department Informatics*, no. 1. Publishing house Science and Economics Varna, 2024, pp. 162–168.

[67] S. Balaji, M. N. Krishnan, M. Vajha, V. Ramkumar, B. Sasidharan, and P. V. Kumar, "Erasure coding for distributed storage: An overview," *Science China Information Sciences*, vol. 61, pp. 1–45, 2018.

[68] a. pricing, "Amazon s3 pricing - cloud object storage - aws," 2024. [Online]. Available: https://aws.amazon.com/s3/pricing/

[69] J. Lampinen, "Multiobjective nonlinear pareto-optimization," *Pre-investigation Report, Lappeenranta University of Technology*, vol. 114, p. 125, 2000.

[70] Y. Zhu, D. Tian, and F. Yan, "Effectiveness of entropy weight method in decision-making," *Mathematical Problems in Engineering*, vol. 2020, no. 1, p. 3564835, 2020.