# An Advanced Reinforcement Learning Framework for Online Scheduling of Deferrable Workloads in Cloud ComputingSummary Table

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| **Author(s)** | **Title** | **Methodology** | **Key Findings** | **Advantages** | **Limitations** | **url** | **Student Name** |
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| Vaibhav S. Vavilala (2020) | Combining high-performance hardware, cloud computing, and deep learning frameworks to accelerate physical simulations: probing the Hopfield network | Introduces cloud computing, GPU, and AI frameworks for physics simulations; demonstrates large-scale Hopfield network simulations | Cloud-based GPU computing accelerates physics simulations, making them more accessible | Free and easy-to-use cloud-based AI frameworks enhance physics education and research | Requires familiarity with deep learning frameworks | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/3cacqvie45?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Prachi Gandhi |
| Malong Ke, Zhen Gao, Yongpeng Wu, Xiqi Gao, Kat-Kit Wong (2020) | Massive Access in Cell-Free Massive MIMO-Based Internet of Things: Cloud Computing and Edge Computing Paradigms | Proposes a structured sparsity-based generalized AMP algorithm for joint active user detection and channel estimation | Edge computing can achieve similar performance to cloud computing while reducing latency and CPU load | Structured sparsity improves accuracy; edge computing reduces burden on centralized units | Limited by backhaul constraints and computational complexity | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/synymrkipz?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Prachi Gandhi |
| Noman Islam, Zeeshan Islam (2018) | An economic perspective on major cloud computing providers | Cost-based comparison of cloud service providers for different use cases | CloudSigma, Joyent, and ElasticHosts offer the best price-performance ratio | Economic analysis provides insights for cost-effective cloud selection | Limited scope; does not analyze network bandwidth, availability, or reliability | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/oxzjjsmyxf?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Prachi Gandhi |
| Dinh Thai Hoang, Dusit Niyato, Ping Wang, Shaun Shuxun Wang, Diep Nguyen, Eryk Dutkiewicz (2017) | A Stochastic Programming Approach for Risk Management in Mobile Cloud Computing | Proposes a stochastic programming model for optimizing risk management in mobile cloud computing | Balances cybersecurity investment and cyber insurance to minimize financial loss in MCC environments | Effective in mitigating cyber risks while optimizing costs | Model assumes accurate prediction of cyber threats, which may be difficult in practice | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/sk5yjvjyhb?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Prachi Gandhi |
| Farhan Hyder Sahito, Wolfgang Slany (2013) | Advanced Personnel Vetting Techniques in Critical Multi-Tenant Hosted Computing Environments | Analyzes insider threats in cloud computing and proposes a security framework using cognitive analysis (fMRI) | Multi-layered security strategy and personnel vetting can reduce insider threats in critical cloud environments | Enhances security through cognitive analysis and personnel screening | Raises ethical concerns regarding privacy and human rights | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/lj4lwbp74n?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Prachi Gandhi |
| Zilinghan Li, Shilan He, Pranshu Chaturvedi, Volodymyr Kindratenko, Eliu A. Huerta, Kibaek Kim, Ravi Madduri (2024) | Secure Federated Learning Across Heterogeneous Cloud and High-Performance Computing Resources -- A Case Study on Federated Fine-tuning of LLaMA 2 | Designed APPFL for secure federated learning across cloud and HPC using Globus and AWS. | APPFL enables privacy-preserving training, improving model robustness without transferring data. | Works across different infrastructures, preserving data privacy. | Slight performance drop compared to centralized training. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/ivxc5mno3v?limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Chandana Galgali |
| Marine A. Denolle *et al.* (2022) | Training the Next Generation of Seismologists: Delivering Research-Grade Software Education for Cloud and HPC Computing through Diverse Training Modalities | Conducted multi-modal training workshops on HPC and cloud computing. | Reached global audience; improved seismological research skills in HPC/cloud. | Global accessibility; strong hands-on experience. | In-person workshops required high support; limited follow-up data. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/he3jrzpb3r?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Chandana Galgali |
| George-Marios Fragkoulis, Nikos Karystinos, George Papadimitriou, Dimitris Gizopoulos (2024) | Advancing Cloud Computing Capabilities on gem5 by Implementing the RISC-V Hypervisor Extension | Integrated RISC-V H-extension in gem5 for cloud simulation. | Hypervisor extension works in gem5, with some overhead in simulation time. | Enables RISC-V cloud research in simulation. | Simulation performance impacted; requires real-world validation. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/r2lua7noyf?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Chandana Galgali |
| Hang Dong *et al.* (2024) | An Advanced Reinforcement Learning Framework for Online Scheduling of Deferrable Workloads in Cloud Computing | Proposed OSDEC, an RL-based framework for scheduling deferrable cloud jobs. | OSDEC outperforms traditional methods in resource utilization and waiting time. | Balances resource efficiency with low job delays. | Needs more validation and a safety mechanism for real-world use. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/6iil73ohw5?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing#Au> | Chandana Galgali |
| Ali Gholami, Erwin Laure (2016) | Advanced Cloud Privacy Threat Modeling | Extended CPTM methodology for privacy threat modeling in cloud computing. | Method helps integrate privacy laws into cloud software development. | Promotes privacy-by-design in cloud applications. | Not validated in real-world scenarios yet. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/vvwra46ucz?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Chandana Galgali |
| Sotiris P. Gayialis, Evripidis P. Kechagias, Angeliki Deligianni, Grigorios D. Konstantakopoulos, Georgios A. Papadopoulos (2021) | Implementation Technologies of an Advanced Cloud-based System for Distribution Operations | Developed a cloud-based system for urban freight routing and scheduling. | Improves delivery efficiency, adapting routes in real-time to disruptions. | Scalable SaaS solution for logistics companies. | Needs real-world trials to validate. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/gbletqojsf?isDashboardExpanded=true&limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Chandana Galgali |
| Keichi Takahash, Tomonori Hayami, Yu Mukaizono,  Yuki Terama and Susumu Date  (2025) | Performance analysis of mdxII: A next-generation cloud platform for cross-disciplinary data science research | As with public clouds, mdxII allows users to flexibly choose the number of vCPUs for a VM, currently ranging from 1 to 224 vCPUs. However, it is infeasible to evaluate all VMconfigurations. Thus, in the first half of the evaluation, we focus on a 16-vCPU VM, since the minimum purchasable vCPU quota is currently 16, and it is expected that many users will launch VMs of this size. In the second half of the evaluation, we focus on a 224-vCPU VM, since it occupies a full compute node and thus allows us to directly compare its performance with a bare metal server that has the same hardware configuration. | mdx II outperforms AWS in compute, memory, and storage performance. Compute-intensive tasks run efficiently, but memory-intensive ones face bandwidth limits. Network reaches 80 Gbps with virtio multiqueue enabled. Lustre storage excels, while Cloudian HyperStore underperforms in S3 tasks. | mdx II offers high-performance cloud computing with superior compute, memory, and storage capabilities compared to AWS. It enables customizable virtual environments, efficient Lustre storage, and high network throughput, making it ideal for data-intensive workloads. | mdx II has memory bandwidth limits due to no vCPU pinning, and Cloudian HyperStore underperforms in S3 tasks, needing cloud optimization | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/g5t455bvnz?limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Mahek Thakkar |
| Ivy Peng, Martin Schulz, Utz-Uwe Haus, Craig Prunty, Pedro Marcuello, Emanuele Danovaro, Gabin Schieffer, Jacob Wahlgren, Daniel Medeiros, Philipp Friese, and Stefano Markidis  (2024) | OpenCUBE: Building an Open Source Cloud Blueprint with EPI Systems | Builds an open cloud system using European hardware, focusing on energy efficiency and smooth cloud-HPC integration. | Shows that cloud and HPC can work together efficiently, improving data processing in weather forecasting and drug discovery. | Offers a flexible, energy-saving, and open cloud solution that supports Europe’s tech independence. | Still in early stages, needs more testing, better scaling, and wider industry use. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/374allyyon?limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Mahek Thakkar |
| Navidreza Asadi, and Maziar Goudarzi, Senior Member, IEEE  (2023) | An Ensemble Mobile-Cloud Computing Method for Affordable and Accurate Glucometer Readout | A mobile-cloud computing system with an ensemble deep learning model processes glucometer images, integrating predictions from both mobile and cloud for higher accuracy. A data synthesizer generates training samples to overcome data scarcity. | The model achieves 92.1% and 97.7% accuracy, improving previous methods by ~40%. It reduces bandwidth use by 45× with minimal accuracy loss and offers better availability than alternative approaches. | Balances accuracy and availability, ensuring reliable predictions even with poor connectivity. The ensemble model enhances robustness, and synthetic data generation overcomes data limitations. | Requires high computational power for training. Accuracy may drop with poor image quality, and knowledge of the device’s measurement unit improves performance. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/mwm6ionruf?limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Mahek Thakkar |
| Shreshth Tuli, Giuliano Casale, Nicholas R. Jennings  (2022) | Learning to Dynamically Select Cost Optimal Schedulers in Cloud Computing Environments | MetaNet is a deep learning model that selects the best scheduler in real-time to reduce cloud computing costs. | MetaNet lowers costs by 11%, saves 43% more energy, and reduces SLA violations by 13% compared to other methods. | It chooses the most cost-effective scheduler automatically, saving money and energy while improving performance. | Its accuracy depends on the prediction quality, so errors in the model can lead to less efficient scheduling. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/mregwozmc5?limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Mahek Thakkar |
| PETER VAILLANCOURT,  BENNETT WINEHOLT,  BRANDONBARKER, PLATO DELIYANNIS,  JACKIE ZHENG,  AKSHAY SURESH,  ADAMBRAZIER,  RICH KNEPPER,  RICH WOLSKI  (2020) | Reproducible and Portable Workflows for Scientific Computing and HPC in the Cloud | Uses Docker, Terraform, and Ansible to automate and deploy scientific workflows on AWS and Aristotle Cloud for portability and reproducibility. | Simplifies cloud deployment, improves reproducibility, enables multi-cloud execution, and scales HPC applications efficiently. | Reduces setup, speeds up computing, and supports scalable scientific workflows. | Adds cost, may lag behind HPC, and needs cloud tool expertise. | <https://research-ebsco-com.library.somaiya.edu/c/ceqbbb/search/details/et5abm4twb?limiters=FT%3AY&q=Advanced%20Cloud%20Computing> | Mahek Thakkar |
| Sukhpal Singh Gill , Shreshth Tuli, Minxian Xu, Inderpreet Singh, Karan Vijay Singh, Dominic Lindsay, Shikhar Tuli, Daria Smirnova, Manmeet Singh, Udit Jain, Haris Pervaiz, Bhanu Sehgal, Sukhwinder Singh Kaila, Sanjay Misra, Mohammad Sadegh Aslanpour, Harshit Mehta, Vlado Stankovsi and Peter Garraghan(2019) | Transformative Effects of IoT, Blockchain and Artificial Intelligence on Cloud Computing: Evolution, Vision, Trends and Open Challenges | The study is a **systematic review** that evaluates, integrates, and upgrades existing research on cloud computing, particularly in relation to emerging paradigms like **IoT, AI, and Blockchain**. The paper reviews **140 research papers** and categorizes them to identify key research challenges, historical evolution, and the impact of these new paradigms on cloud computing. The study proposes a **conceptual model** that integrates various technological advancements to create a holistic next-generation computing environment​ | The combination of **AI, IoT, and Blockchain** will drive the future of cloud computing, offering more innovative applications and transforming cloud computing capabilities.  AI can **reduce energy consumption**, improve **latency and fault tolerance**, and assist in **automatic programming and error detection**.  IoT can **enhance cloud computing by enabling real-time applications** with lower latency, supported by 5G technology.  Blockchain offers a solution for **enhanced data security, reliability, and trust** within cloud computing environments​ | **Enhanced software development**: Cloud computing enables a faster and more parallelized development process.  Increased **operational efficiency**: Cloud computing provides sufficient computing resources, better resource management, and virtualization capabilities.  **Reduced cost**: Researchers have used cloud computing to reduce operational, delivery, and software development costs​.  **improved security and fault tolerance**: Blockchain integration provides a distributed ledger system that helps prevent data tampering and security breaches.  **Data analytics for multiple domains**: Cloud computing improves big data analytics and is beneficial for industries like healthcare, government, and retail.  **Enhances service quality**: Cloud computing improves quality of service (QoS) with dynamic resource provisioning, enabling better computing power distribution​. | **Data Migration Issues**: Cloud providers use different APIs for offering services, leading to problems when migrating data between clouds. Legacy systems may require re-implementation.  **Security Concerns**: While Blockchain enhances security, there are still challenges related to blockchain vulnerabilities, data integrity, and security risks in cloud environments​.  **Reliability and Availability Risks**: If all data is stored in the cloud, it becomes vulnerable to cyberattacks or disasters. Developers need to maintain local backups.  **High Cost and Maintenance Overheads**: Implementing blockchain in cloud and fog computing requires significant storage and computational resources​.  **Fog and Edge Computing Challenges**: While these technologies help reduce latency, they introduce complexities in resource provisioning,scheduling, and security​. | <https://arxiv.org/pdf/1911.01941> | Akanksha Mishra |
| Eduard Marin, Diego Perino, and Roberto Di Pietro, Telefonica Research, Spain, Hamad Bin Khalifa University College of Science and Engineering, Doha-Qatar(2022) | Serverless Computing: A Security Perspective | The study is a review-based security analysis of serverless computing. The methodology involves:  **Reviewing and categorizing** current serverless architectures.  **Analyzing security risks** associated with serverless platforms.  **Identifying advantages and drawbacks** of serverless computing in comparison to traditional paradigms like monolithic applications and microservices  **Proposing security recommendations** and future research directions | **Serverless computing improves security in some aspects:**  Short-lived, stateless functions make long-term attacks harder (e.g., Advanced Persistent Threats - APTs).  Auto-scaling capabilities resist traditional Denial-of-Service (DoS) attacks better than monolithic or microservice architectures.  Delegation of security responsibilities to cloud providers reduces developer burden in infrastructure security.  **Serverless computing introduces new security challenges**:  Larger attack surface due to multiple function calls and interactions.  Potential for billing attacks (Denial-of-Wallet attacks) where adversaries can inflate cloud costs by triggering excessive function executions.  Limited visibility into underlying infrastructure, making security auditing difficult.  Side-channel attacks could arise from shared execution environments​  ​ | **Reduced attack persistence**:  Stateless, short-lived functions make persistent attacks difficult.  **Automatic security updates**: Cloud providers manage security patches, reducing developer workload.  **Auto-scaling mitigates DoS attacks:**Serverless platforms auto-scale efficiently, handling DoS-like conditions without manual intervention.  **Granular security policies**:Smaller, isolated functions allow fine-grained security configurations​. | **Larger attack surface**: Many small functions increase entry points for attacks.  **Denial-of-Wallet (DoW) attacks**: Serverless pay-per-use billing model is vulnerable to cost-exploitation attacks.  **Weak function isolation**: Execution environments may be reused, enabling data leakage or long-lived malware.  **Security vs. performance trade-offs**: To optimize speed, providers may sacrifice some security measures.  **Limited security transparency**: Cloud providers hide infrastructure details, making security auditing challenging​. | <https://arxiv.org/pdf/2107.03832> | Akanksha Mishra |
| Ajay Chaudhary, Sateesh K Peddoju, Vikas Chouhan(2023) | Secure Authentication and Reliable Cloud Storage Scheme for IoT-Edge-Cloud Integration | The study proposes a secure authentication and reliable cloud storage scheme for IoT-Edge-Cloud integration. The methodology includes:  **Development of a secure authentication scheme** for integrating users, IoT nodes, edge nodes, and cloud infrastructure.  **Implementation of a cloud data storage and retrieval mechanism** using Erasure Coding to ensure data reliability.  **Security validation** of the proposed authentication protocols using the AVISPA (Automated Validation of Internet Security Protocols and Applications) simulator.  **Comprehensive security analysis** to assess the scheme’s resilience against attacks like impersonation,replay,stolen- verifier, and guessing attacks​. | **Vulnerabilities in existing authentication protocols**:  Existing authentication schemes based on hash functions and XOR operations are still vulnerable to several attacks, including replay attacks, impersonation attacks, and stolen-verifier attacks.  **Proposed scheme ensures secure authentication and reliable cloud storage**:  **Mutual authentication** between IoT nodes, edge nodes, cloud servers, and users.  **Erasure coding** mechanism for reliable data storage and retrieval in the cloud.  **Secure communication** through public-key cryptography and session keys.  **AVISPA validation** confirms security against various attacks​ | **Enhanced security:**Mutual authentication ensures that only authorized IoT nodes, users, and cloud infrastructure components can communicate.  **Protection against multiple security threats**: Resists replay attacks, impersonation attacks, and stolen-verifier attacks.  **Improved reliability** : Uses erasure coding for data storage and recovery, ensuring data consistency even if some fragments are lost.  **Scalability** – The proposed framework supports dynamic IoT nodes and user additions.  **Automatic security validation**: Uses AVISPA simulation to confirm the security properties of the authentication protocol​. | **Resource Constraints**: IoT and edge nodes have limited storage and computing power, making local data storage infeasible.  **Security Threats**: IoT and edge nodes are accessible via the Internet, introducing severe security and privacy risks.  **Data Loss Risks**: While Erasure Coding improves data reliability, some loss may still occur if too many data fragments are lost or corrupted.  **Computational Overhead** : Encryption and encoding processes may increase processing time and energy consumption, especially for memory-constrained IoT devices.  **Authentication Protocol Complexity**: The proposed authentication mechanisms involve multiple steps, which might introduce additional overhead in resource-limited IoT environments​. | <https://link-springer-com.library.somaiya.edu/article/10.1007/s10723-023-09672-z> | Akanksha Mishra |
| Mostafa Raeisi-Varzaneh, Omar Dakkak, Yousef Fazea, Mohammed Golam Kaosar(2024) | Advanced cost-aware Max–Min workflow tasks allocation and scheduling in cloud computing systems | The paper presents an Advanced Cost-Aware Max–Min Algorithm for task scheduling in cloud computing. The methodology involves:  **Enhancing the traditional Max–Min algorithm** to improve makespan, waiting time, and resource utilization.  **Integrating a cost-aware scheduling algorithm** to optimize execution costs while maintaining efficiency.  **Dynamic task allocation** that adjusts based on cost considerations to optimize cloud resource usage.  **Comparative analysis with existing algorithms**: The proposed Advanced Max–Min Algorithm is compared with traditional Max–Min, Min–Min, and Shortest Job First (SJF) scheduling algorithms.  **Performance evaluation**: The approach is tested in a cloud computing environment, evaluating makespan, waiting time, and core utilization | **The Advanced Max–Min Algorithm outperforms traditional scheduling approaches**:  Reduces makespan and waiting time compared to Max–Min, Min–Min, and SJF algorithms.  Enhances resource utilization efficiency by reducing VM idleness.  Integrates a cost-aware scheduling mechanism, optimizing execution costs in cloud environments.  Achieves better economic efficiency by dynamically adjusting task allocation based on cost constraints​.  **Performance Improvement Over Existing Algorithms**:  Reduction in makespan: The Advanced Max–Min Algorithm reduces task execution time compared to traditional scheduling algorithms.  Reduction in waiting time: Compared to traditional scheduling methods, the proposed approach significantly reduces task waiting times.  **Improved resource utilization**: VMs experience up to a 34% increase in core utilization efficiency.​ | **Cost Efficiency**: The integration of a cost-aware approach enables dynamic task allocation based on execution costs.  **Optimized Performance**: Improved makespan and waiting time compared to traditional Max–Min, Min–Min, and SJF algorithms.  **Efficient Resource Utilization**: The proposed model effectively assigns tasks to virtual machines to improve resource allocation.  **Scalability**: The method is well-suited for cloud computing systems with a large number of tasks and virtual machines.  **Better Economic Efficiency**: Reduces idleness cost of VMs, optimizing operational expenses for cloud providers​ | **Computational Complexity** : The Advanced Max–Min Algorithm has a time complexity of O(mn²), similar to the traditional Max–Min algorithm, which may be inefficient for extremely large cloud systems.  **Cost-Performance Tradeoff**: While the cost-aware approach reduces costs, prioritizing lower-cost VMs may increase execution time if not tuned properly.  **Limited Task Dependency Handling**:  The method does not effectively **optimize dependent tasks** and might favor certain tasks over others, causing potential delays.  **Possible Resource Fragmentation** – Due to its cost-focused nature, the algorithm may result in some inefficient resource allocations​. | <https://link-springer-com.library.somaiya.edu/article/10.1007/s10586-024-04594-1> | Akanksha Mishra |
| Marine A. Denolle , Carl Tape , Ebru Bozdag , Yinzhi Wang, Felix Waldhauser, Alice-Agnes Gabriel , Jochen Braunmiller, Bryant Chow, Liang Ding, Kuan-Fu Feng, Ayon Ghoshb , Nathan Groebner, Aakash Gupta, Zoe Krauss, Amanda M. McPherson, Masaru Nagasoa , Zihua Niu, Yiyu Ni1 , Rıdvan Örsvurana , Gary Pavlis, Felix Rodriguez-Cardozo1, Theresa Sawi, Nico Schliwa, David Schneller, Qibin Shi, Julien Thurin, Chenxiao Wang, Kaiwen Wang, Jeremy Wing Ching Wong, Sebastian Wolf and Congcong Yuan(2024) | Training the Next Generation of Seismologists: Delivering Research-Grade Software Education for Cloud and HPC Computing through Diverse Training Modalities | The study presents training workshops aimed at teaching seismologists how to use Cloud and High-Performance Computing (HPC) for large-scale seismic data processing.  Various training modalities were implemented, including virtual, hybrid, and in-person workshops.  Participants were trained on:  Earthquake source parameter estimation  Forward and adjoint wavefield simulations  Machine learning applications in seismology  Using HPC and cloud computing for seismic data analysis  The curriculum focused on open and reproducible science, big data analytics, and computing infrastructure access​ | **Growing Demand for Advanced Computing in Seismology**:  The increasing volume of seismic data necessitates HPC and cloud-based solutions.  Traditional educational programs in seismology lack adequate training in these areas.  **Success of Multi-Modal Training Approaches**:  Hybrid workshops provided better engagement than purely virtual formats.  Hands-on sessions using cloud instances and containerized environments helped participants grasp practical applications.  **Impact on Participant**:  Many participants improved their skills in seismic data processing, cloud computing, and machine learning.  Workshops filled a gap in computational seismology training. | **Enhances computational skills**: Participants gained hands-on experience with HPC, cloud computing, and machine learning.  **Supports open science**: Training focused on open-source tools and reproducible research practices  **Bridges the knowledge gap**: Many seismologists were unfamiliar with advanced computing techniqu**es** prior to the workshops.  **Flexible delivery methods**: A mix of virtual, hybrid, and in-person formats allowed broader accessibility​ | **Limited participation from undergraduates**: Most participants were graduate students or researchers, indicating a gap in early education in computational seismology.  **Challenges with cloud accessibility**: Some participants struggled with configuring cloud environments and accessing HPC resources.  **Fast-paced curriculum**: Some attendees found the workshops too intensive, requiring additional follow-up sessions.  **Technical barriers**: Differences in technical expertise among participants led to disparities in learning outcomes.​ | <https://arxiv.org/pdf/2409.19147> | Akanksha Mishra |
| Animesh Kumar (2024) | AI-Driven Innovations in Modern Cloud Computing | The study employs a literature review and analytical approach to explore the intersection of AI and cloud computing. It examines existing AI-driven cloud computing frameworks and their impact on:  Resource Management:  AI algorithms are used to optimize cloud resource allocation dynamically.  Automated provisioning and scaling techniques ensure efficiency.  Security Enhancements:  AI-powered anomaly detection and predictive threat prevention models are studied.  The paper analyzes how machine learning improves cybersecurity defenses.  Automation & Efficiency:  AI-driven cloud automation tools reduce operational overhead.  Predictive maintenance models are explored for improving system reliability.  Personalized User Experiences:  The paper examines AI-driven personalization, including recommendation engines and NLP-based chatbots.  Emerging Trends & Future Directions:  AI’s role in edge computing, quantum computing, and ethical AI governance in cloud environments is evaluated. | Enhanced Resource Management  AI optimizes cloud computing resources through predictive analytics.  Automated provisioning and scaling improve efficiency, reducing operational costs.  Improved Security and Threat Detection  AI enhances cloud security by detecting anomalies and preventing cyber threats.  Machine learning models predict security risks before they occur.  Automation for Operational Efficiency  AI-driven automation minimizes human intervention in cloud management.  Predictive maintenance reduces system downtime and enhances reliability.  Personalized User Experiences  AI enables better personalization through recommendation engines and NLP-powered chatbots.  Cloud services powered by AI improve customer engagement and satisfaction.  Integration of AI with Edge and Quantum Computing  AI in edge computing enables real-time data processing closer to the source.  Quantum computing and AI together could revolutionize cloud computational capabilities.  AI-Driven Cost Reduction and Scalability  Businesses can optimize cloud expenses by using AI for auto-scaling and dynamic resource allocation.  AI enhances multi-cloud and hybrid cloud strategies for better adaptability.  Challenges in AI-Cloud Integration  Data privacy and compliance issues remain a major concern.  Ethical AI governance frameworks are essential to prevent bias and ensure transparency. | Optimized Resource Management – AI automates resource allocation, reducing costs and improving efficiency.  Enhanced Security – AI detects cyber threats in real time, preventing breaches.  Automation & Efficiency – Reduces manual workload with AI-powered predictive maintenance.  Personalized User Experience – AI-driven recommendations and chatbots improve customer engagement.  Scalability & Cost Reduction – AI enables auto-scaling and optimizes cloud expenses.  Faster Data Processing – AI enhances real-time analytics and decision-making.  Future-Ready Innovations – AI integration with edge and quantum computing expands possibilities. | **Data Privacy & Security Risks** – AI models require vast data, increasing exposure to breaches.  **High Implementation Costs** – AI-powered cloud solutions can be expensive to develop and maintain.  **Bias in AI Models** – Poorly trained AI can lead to biased decision-making.  **Complex Integration** – AI adoption in cloud environments requires skilled professionals.  **Compliance & Ethical Concerns** – Meeting regulations like GDPR remains a challenge.  **Dependence on Internet Connectivity** – AI-driven cloud systems require stable, high-speed connections. | https://arxiv.org/pdf/2410.15960 | Prannoy Banerjee |
| Manoj Bhoyar  (2022) | Innovative Paradigms in Advanced Cloud Computing: Exploring Edge Computing, Serverless Architectures, and Autonomous Resource Management for Enhanced Scalability and Efficiency | Literature review and analysis of emerging cloud computing technologies.  Comparison of traditional and modern cloud paradigms (Edge, Serverless, and AI-driven automation).  Performance benchmarking to assess scalability and efficiency. | **Edge computing** improves real-time processing and reduces latency.  **Serverless architectures** enable cost-efficient, scalable applications without infrastructure management.  **Autonomous resource management** optimizes cloud efficiency using AI and machine learning.  Combining these approaches enhances **scalability, automation, and system reliability**. | **Reduced latency** with edge computing.  **Lower costs** with pay-as-you-go serverless models.  **Improved efficiency** through AI-driven automation.  **Scalable and flexible** cloud solutions. | **Security concerns** in multi-tenant environments.  **Vendor lock-in** for serverless architectures.  **Coordination challenges** in distributed edge systems. | https://www.irejournals.com/paper-details/1703606 | Prannoy Banerjee |
| Prof. S. B. Bele  Gaurav Mehakar  Srushti Kharwade  Chetan Rathod  Gaurav Raut  Rishiraj Bondre  (2024) | Cloud Computing: Trends, Challenges, and Future Directions | **Qualitative and descriptive approach** based on literature review.  Data gathered from **peer-reviewed journals, industry reports, and white papers** (last five years prioritized).  **Thematic synthesis** was conducted to categorize trends, challenges, and future directions. | **Multi-cloud and hybrid cloud adoption** is increasing to avoid vendor lock-in.  **Edge computing** enables real-time data processing with reduced latency.  **AI and machine learning** are revolutionizing cloud services.  **Security risks and regulatory compliance** remain major concerns.  **Quantum computing and autonomous cloud management** are future trends. | **Scalability & flexibility** – Resources can expand or contract as needed.  **Cost efficiency** – Pay-as-you-go pricing reduces upfront investment.  **Enhanced data analytics** – AI-driven insights improve decision-making.  **Faster processing** – Edge computing enables real-time analysis. | **Security vulnerabilities** – Data breaches and compliance risks.  **Cost management issues** – Unmonitored cloud resources lead to high costs.  **Vendor lock-in** – Limited flexibility in switching cloud providers.  **Technical complexity** – Requires skilled expertise for integration. | https://doi.org/10.22214/ijraset.2024.64993 | Prannoy Banerjee |
| Safana Alzide (2024) | Cloud Computing: Evolution, Challenges, and Future Prospects | **Qualitative review** of cloud computing advancements using peer-reviewed sources.  **Historical analysis** of cloud evolution, from time-sharing to modern multi-cloud strategies.  **Thematic approach** to categorize trends, challenges, and future prospects. | **Cloud computing has evolved from time-sharing systems to AI-driven multi-cloud models.**  **Edge computing and serverless architectures** are driving real-time processing improvements.  **Quantum computing and AI integration** are the next frontiers in cloud innovation.  **Security risks, regulatory compliance, and vendor lock-in** remain key challenges. | **Scalability & flexibility** – Organizations can scale resources on demand.  **Cost efficiency** – Reduces infrastructure costs with a pay-as-you-go model.  **Enhanced collaboration** – Enables global connectivity and remote work.  **Disaster recovery** – Ensures data safety and business continuity. | **Security & privacy concerns** – Risks of data breaches and cyber threats.  **Regulatory complexity** – Compliance with data protection laws like GDPR and HIPAA.  **Performance issues** – Latency concerns for real-time applications.  **Vendor lock-in** – Dependence on specific cloud providers limits flexibility. | https://doi.org/10.70715/jitcai.2024.v1.i1.007 | Prannoy Banerjee |
| Hoa T. Nguyen (University of Melbourne, Australia)  Prabhakar Krishnan (Amrita Vishwa Vidyapeetham, India)  Dilip Krishnaswamy (Quantum Walks Technologies, USA)  Muhammad Usman (University of Melbourne & Data61, CSIRO, Australia)  Rajkumar Buyya (University of Melbourne, Australia) (2024) | Quantum Cloud Computing: A Review, Open Problems, and Future Directions | **Literature review** on quantum cloud computing models, platforms, and applications.  **Comparative analysis** of classical cloud computing vs. quantum cloud computing.  **Exploration of emerging paradigms** like quantum serverless, distributed quantum computing, and security challenges. | **Quantum cloud computing (QCC)** enables remote access to quantum computing resources.  **Hybrid quantum-classical models** are widely used due to current hardware limitations.  **Quantum serverless computing** offers a scalable approach to managing quantum workloads.  **Security & privacy concerns** need robust cryptographic solutions in QCC environments.  **Future research** focuses on optimizing quantum resource management and reducing quantum noise. | **Democratizes access** to quantum computing resources.  **Reduces operational costs** compared to maintaining physical quantum systems.  **Supports complex problem-solving** in cryptography, machine learning, and molecular simulation.  **Enables hybrid computing models** that blend classical and quantum computing. | **High error rates** in noisy intermediate-scale quantum (NISQ) devices.  **Limited qubit coherence time** affects reliability.  **Security risks** in multi-tenant quantum cloud platforms.  **Quantum resource management** needs further optimization. | https://arxiv.org/abs/2404.11420s | Prannoy Banerjee |