Available online at https://www.gyanvihar.org/researchjournals/ctm_journals.php
SGVU International Journal of Convergence of Technology and Management
E-ISSN: 2455-7528
Vol.10 Issue 2 Page No 01-09

An Overview of Cloud Disaster Recovery Automated Systems

[1] Favour Kefas Bonga, [2] Pooja Varshney
Department of Computer Science and Information Technology
Suresh Gyan Vihar University Jaipur, India
favour.61671@mygyanvihar.com, pooja.varshney@mygyanvihar.com

Abstract— Disaster recovery systems are versatile recovery systems, which may have one or more automated processes in their functionality, and how these automated processes benefit the cloud recovery systems also how these automated processes in the cloud recovery are more efficient than the earlier systems, with the full enlistment of the versatility and efficiency of each system in handling a cloud disaster.

Cloud disaster recovery systems at an earlier stage were mainly manually controlled, which means a cloud disaster operator took charge when a cloud disaster occurred, but with advancement in cloud technologies semi-automated and fully automated cloud disaster recovery processes have been established which will seamlessly make the cloud disaster recovery process much faster, consistent and reliable in handling a cloud disaster to suit the customers /business oriented needs, these new improved systems curtails all the features a cloud disaster recovery will require and more, as the now have analysis systems, segmenting formats, storage utilization, and engraved with more adequate features that will ensure that a cloud disaster has been recovered to the exact point and time, with all requirements of the customer /organization met.

Carefully detailed work was made to give an overview look at various automated cloud recovery systems, features functionalities, disaster recovery tier, analysis systems, and various areas of concern which they used to integrate and make performance more efficient in the cloud disaster recovery system, these systems have been varied down according to this special features which they and most essentially how they enable better efficiency.

In today's digital landscape, organizations are increasingly relying on cloud computing to store critical data, host applications, and deliver services. While cloud technology offers numerous benefits, it also introduces unique challenges, particularly in terms of ensuring business continuity and disaster recovery. The rapid adoption of cloud solutions has underscored the need for robust and efficient strategies to safeguard data and systems in the event of disasters or disruptions.

Keywords—; Cloud-disaster recovery, automated processes, fail-over, replication systems.

I. INTRODUCTION

These early cloud-based backup services focused on providing offsite storage for businesses' data backups, which was seen as a cost-effective alternative to traditional backup solutions. These services were typically managed through web-based interfaces and offered varying degrees of automation and management features. However, they were not fully automated and relied on manual processes for backup and recovery operations.

Replication latency can be solved by the use of a synchronous replication strategy, whereby it aims at ensuring a high probability of fulfilling the requirements of the recovery point objective and recovery time objective [1].

As cloud computing technology evolved, disaster recovery systems became more sophisticated, with automated failover and replication capabilities. This allowed businesses to recover from disasters more quickly and efficiently, with minimal disruption to their operations.

Correspondence to: Pooja Varshney, Department of Computer Science and Information Technology, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: pooja.varshney@mygyanvihar.com

In the event of a disaster, automated systems would automatically failover to a secondary location, ensuring continuity of operations.The objective of their research is to design a solution capable of surviving cloud disasters. Factors like initial cost, data traffic, and system performance should also be considered[2].

In the mid-2010s, disaster recovery as a service (DRaaS) emerged as a new cloud-based service offering. DRaaS providers offer a range of automated services, including backup, recovery, and failover, delivered over the cloud. This allowed businesses to benefit from the flexibility, scalability, and cost-effectiveness of cloud computing while ensuring the resilience of their operations. DRaaS providers typically offered automated failover and replication capabilities, as well as other management features, such as automated backup scheduling and reporting.

Today, cloud disaster recovery systems continue to evolve, with advances in automation, orchestration, and artificial intelligence driving further improvements in performance and resilience. Modern cloud DR systems are typically managed through web-based interfaces and offer a range of automation and management features, such as automated failover, application-level recovery, and cloud-to-cloud replication. Additionally, modern cloud DR systems are designed to be highly scalable, allowing businesses to quickly and easily scale their DR resources up or down as needed.

Overall, the history of cloud disaster recovery automated systems has been characterized by a shift from traditional, on-premises backup and recovery solutions to cloud-based, automated solutions that offer greater flexibility, scalability, and cost-effectiveness. As cloud computing technology continues to evolve, we can expect to see further advancements in the automation and orchestration of disaster recovery systems, resulting in even greater resilience and performance for businesses. We took a system of core/context analysis theory, where the system is divided into server storage and server networks; the purpose is a disaster recovery operation scheme that will enable the recovery system to make analysis using the core/context scheme, to divide the system so it could be easily analyzed[3].

The history of cloud DR automated systems can be traced back to the early days of cloud computing when organizations began to realize the benefits of using cloud-based resources for disaster recovery. Early cloud DR systems were often designed as a simple backup and restore solution, using basic automation to manage the backup and recovery process.They created a CBADROM which is automated algorithm procedure that functions based on the varies of cost and levels of risk.

Over time, cloud DR systems have evolved to become more sophisticated and automated, leveraging advanced technologies such as machine learning, artificial intelligence, and automation to enhance the resilience and effectiveness of the DR process. Today's cloud DR systems can provide near-instantaneous recovery times and support multi-site failover, enabling organizations to maintain business continuity even in the event of a major disaster.
Cloud disaster recovery automated systems have revolutionized modern cloud computing by providing reliable, efficient, and cost-effective disaster recovery solutions. With the rise of cloud computing, businesses of all sizes have embraced the cloud as a critical part of their infrastructure. However, as with any system, there is always a risk of failure or disruption, which can result in significant downtime and data loss. In the past, traditional disaster recovery solutions involved costly on-premises hardware and software that required significant maintenance and management.

Cloud disaster recovery automated systems, on the other hand, have simplified and streamlined the process of disaster recovery by offering a range of services that can be customized to meet the specific needs of businesses[4]. These services can be tailored to suit the unique needs of businesses in terms of recovery point objectives (RPOs) and recovery time objectives (RTOs).

One of the key benefits of cloud disaster recovery automated systems is the ability to automate the disaster recovery process, reducing the time and effort required to recover data and systems. With automated disaster recovery, businesses can minimize the impact of a disaster and quickly restore services without significant downtime. This means that businesses can maintain business continuity and minimize the financial impact of a disaster.
Cloud disaster recovery automated systems also offer scalability and flexibility, which is critical for modern businesses[5].

As businesses grow and evolve, their disaster recovery needs also change. With cloud-based disaster recovery, businesses can scale their disaster recovery solutions as needed and adjust their RPOs and RTOs to meet changing requirements. This allows businesses to stay agile and adapt to changing business needs without incurring significant costs.

Another benefit of cloud disaster recovery automated systems is the ability to provide real-time monitoring and alerts. With real-time monitoring, businesses can quickly identify potential problems and take action to prevent downtime or data loss. This provides an additional layer of protection and ensures that businesses can respond quickly to any issues that arise[6].

II. KEY CONCEPTS

Cloud disaster recovery automation involves various key concepts, components, and technologies that work together to ensure efficient and reliable recovery of data and

Correspondence to: Pooja Varshney, Department of Computer Science and Information Technology, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: pooja.varshney@mygyanvihar.com

systems in the cloud. Here are some important aspects to consider:

A. Replication Systems

Replication is a key concept in cloud disaster recovery automation. It involves creating and maintaining duplicate copies of data and systems in real-time or near-real-time. ‘

By replicating data and systems to a separate location or cloud environment, businesses can ensure data availability and minimize downtime in the event of a disaster[7].

In cloud disaster recovery automated systems, replication plays a crucial role in ensuring data availability and rapid recovery in the event of a disaster. There are different types and methods of replication used in these systems. Here are some commonly employed types and methods:

a) Synchronous Replication: Synchronous replication involves real-time or near-real-time replication of data between the primary and secondary sites. In this method, changes made to the primary site are immediately synchronized and replicated to the secondary site.It provides a high level of data consistency but may introduce some latency due to the synchronous nature of replication

b) Asynchronous Replication: Asynchronous replication involves replicating data with a time delay between the primary and secondary sites. Changes made at the primary site are periodically transmitted and replicated to the secondary site. Asynchronous replication introduces a certain amount of data lag but offers greater flexibility and scalability. It can tolerate longer distances and network latencies.

c) Snapshot Replication: Snapshot replication captures a point-in-time copy or snapshot of the data and replicates it to the secondary site. It involves periodic or scheduled snapshots of the data, which are then transferred and applied to the secondary site. Snapshot replication is an efficient method for replicating large amounts of data and is often used in conjunction with other replication methods.

B. Virtualization

Virtualization is a fundamental component of cloud disaster recovery automation. It allows organizations to create virtual instances of servers, networks, and storage resources, decoupling the IT infrastructure from physical hardware.

Virtualization enables rapid provisioning, scalability, and flexibility in disaster recovery scenarios[8].

Virtualization in cloud disaster recovery automated systems involves various types and methods that help organizations achieve efficient and flexible recovery capabilities. Here are some common types and methods of virtualization used in cloud disaster recovery

a) Server Virtualization: Server virtualization is one of the most prevalent types of virtualization in cloud disaster recovery. It involves creating multiple virtual machines (VMs) on a single physical server. Each VM operates independently and can run different operating systems and applications. In the event of a disaster, VMs can be replicated or moved to a secondary server or cloud environment, ensuring continuity of services.

b) Network Virtualization: Network virtualization abstracts network resources from the underlying physical infrastructure, enabling the creation of virtual networks. In the context of cloud disaster recovery, network virtualization allows organizations to configure and manage virtual networks, including virtual routers, switches, and firewalls. This provides flexibility in rerouting network traffic during a disaster and facilitates the establishment of secure connections between primary and backup environments.

c) Storage Virtualization: Storage virtualization abstracts physical storage resources into virtualized storage pools. It allows organizations to aggregate and manage storage from multiple devices and locations as a single virtual storage system. In cloud disaster recovery, storage virtualization enables efficient replication and synchronization of data between primary and backup storage arrays or cloud storage services.

C. Orchestration

Orchestration refers to the automated coordination and management of various tasks and processes involved in cloud disaster recovery. It involves defining workflows, sequencing activities, and managing dependencies to ensure a smooth and efficient recovery process.

Orchestration tools streamline the execution of recovery procedures and help organizations achieve desired recovery time objectives (RTOs) and recovery point objectives (RPOs) [9].

In cloud disaster recovery automated systems, there are different types and methods of orchestration that help manage and coordinate the recovery processes. Here are some common types and methods of orchestration used in cloud disaster recovery:

a) *Workflow-based Orchestration:* Workflow-based orchestration involves defining and executing recovery workflows that outline the sequence of tasks and activities to be performed during the recovery process. Workflows

Correspondence to: Pooja Varshney, Department of Computer Science and Information Technology, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: pooja.varshney@mygyanvihar.com

specify the dependencies, conditions, and actions required for each step.

The automation and coordination of complex recovery procedures**,** ensuring that tasks are executed in the correct order and with the necessary dependencies[10].

b) Policy-based Orchestration: Policy-based orchestration involves the use of predefined policies to automate recovery decisions and actions based on specific conditions or events. Policies define rules, thresholds, and triggers that determine the automated actions to be taken during the recovery process. For example, a policy may specify that if a particular application or system becomes unavailable, it should be automatically failed over to a backup instance.

c) Event-driven Orchestration: Event-driven orchestration relies on real-time events and triggers to initiate and coordinate recovery actions. Events can include system failures, network interruptions, or specific alerts from monitoring systems. When an event occurs, the orchestration system automatically executes predefined actions to recover the affected components or systems.

III. TYPES OF DISASTER RECOVERY AUTOMATION

Automation: Automation plays a crucial role in cloud disaster recovery. It involves the use of scripts, policies, and tools to automate repetitive tasks and processes. Automated backup, replication, failover, and recovery procedures enable faster and more reliable recovery, reducing the need for manual intervention and minimizing human errors.

Automation in cloud disaster recovery systems involves various types and methods to streamline and optimize the recovery process[11].

Here are some common types and methods of automation in cloud disaster recovery

A. Backup Automation

Backup automation involves the automated scheduling, execution, and management of data backup processes. It ensures that data is regularly backed up to remote or secondary locations. Automation tools can perform incremental backups, where only the changes since the last backup are saved, reducing storage requirements and backup time.

B. Replication Automation

Replication automation focuses on the automated replication of data and systems to a secondary location or cloud environment. It involves continuous or near-real-time synchronization of data between primary and backup systems. Automation tools monitor changes in the primary environment and replicate them to the backup environment to ensure data consistency and availability.

C. Failover Automation

Failover automation automates the process of switching from the primary system to a backup or secondary system in the event of a failure or disaster. It involves automatically redirecting traffic and workload to the secondary system to maintain service availability. Failover automation ensures minimal downtime and a seamless transition to the backup environment

D. Testing and Validation Automation

Testing and validation automation is crucial to ensure the effectiveness and reliability of a disaster recovery system. Automation tools enable the automated testing of recovery procedures, validating the integrity of backups, replication, and failover processes. This helps identify potential issues and ensure that the recovery system functions as intended.

E. Configuration and Provisioning Automation

Configuration and provisioning automation focuses on automating the setup and deployment of infrastructure resources in the backup or recovery environment. It involves automatically provisioning virtual machines, networks, storage, and other necessary resources based on predefined templates or scripts. This reduces manual effort and accelerates the recovery process.

IV. TYPES OF DISASTER RECOVERY AUTOMATED SYSTEMS

A. Zerto Virtual Replication

Zerto offers a disaster recovery solution called Zerto Virtual Replication. It provides near-real-time replication and automated failover and failback capabilities for virtualized environments. Zerto's continuous data protection technology enables

Correspondence to: Pooja Varshney, Department of Computer Science and Information Technology, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: pooja.varshney@mygyanvihar.com

organizations to recover applications and data with min downtime and data loss.

B. VMware Site Recovery Manager (SRM):

VMware SRM is a disaster recovery automation tool specifically designed for VMware virtualized environments. It integrates with VMware vSphere and enables automated recovery plans, non-disruptive testing, and centralized management of recovery operations. VMware SRM helps organizations ensure the availability of critical applications and data during a disaster.

C. AWS Disaster Recovery

Amazon Web Services (AWS) provides various services and tools to support disaster recovery automation. AWS Disaster Recovery offers solutions like AWS CloudEndure and AWS Backup, which enable automated replication, backup, and recovery of workloads and data in the AWS cloud. These services help organizations achieve business continuity and minimize downtime.

D. Azure Site Recovery

Azure Site Recovery is a disaster recovery service offered by Microsoft Azure. It enables organizations to replicate on-premises or Azure-based workloads to Azure and automate failover and failback processes. Azure Site Recovery supports both physical and virtualized environments, providing seamless application availability during disruptions.

E. Google Cloud VMware Engine

Google Cloud VMware Engine provides a managed VMware the environment on Google Cloud Platform (GCP). It allows organizations to replicate and protect their VMware workloads using familiar VMware tools and automation capabilities. The service enables automated failover and failback, ensuring the continuity of critical applications.

F. Backup AutomationVeeam Availability Suite

Veeam offers a comprehensive data protection and disaster recovery solution with its Veeam Availability Suite. It combines backup, replication, and recovery features to ensure the availability of virtual, physical, and cloud-based workloads. Veeam's automation capabilities streamline disaster recovery processes and enable fast and reliable recovery.

G. IBM Resiliency Orchestration

IBM Resiliency Orchestration provides a disaster recovery automation platform that helps organizations manage and automate the recovery of their IT infrastructure. It offers centralized management, monitoring, and reporting for multi-vendor environments, enabling organizations to automate recovery workflows and achieve business continuity.

TABLE 1 TABLE OF PROS AND CONS

Example	**Pros**	**Cons**
Zerto Virtual Replication	*Near-real-time replication for minimal data loss. *Automated failover and failback processes. *Supports multi-cloud and hybrid environments *Continuous data protection technology.	*Requires licensing and ongoing maintenance costs. *Limited to virtualized environments *May require specialized knowledge for implementation and management.
VMware Site Recovery Manager (SRM)	*Seamless integration with VMware vSphere. *Automated recovery plans and centralized management. *Non-disruptive testing and validation. *Extensive support for VMware virtualized environments.	*Limited to VMware-baseinfrastructure *Requires VMware licensing and infrastructure compatibility. *Can be complex to set up and configure.

Correspondence to: Pooja Varshney, Department of Computer Science and Information Technology, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: pooja.varshney@mygyanvihar.com

AWS Disaster Recovery	*Wide range of services for replication, backup, and recovery. *Scalable and flexible solutions. *Seamless integration with AWS infrastructure and services. *Highly reliable and durable storage options.	*Requires expertise in AWS services and configurations *Cost considerations based on data transfer and storage usage. *Limited to workloads hosted on AWS or compatible environments.
Azure Site Recovery	*Supports both on-premises and Azure-based workloads. *Automated failover and failback processes. *Integration with Microsoft ecosystem and Azure services.	*Limited to Microsoft Azure and compatible environments *Complexity in initial setup and configuration. *Potential data transfer and storage costs.
Google Cloud VMware Engine	*Provides a managed VMware environment on the Google Cloud Platform. *Familiar with VMware tools and automation capabilities. *Seamless integration with Google Cloud services.	*Limited to Google Cloud Platform. *Requires expertise in VMware and Google Cloud technologies. *Potential data transfer and storage costs.
Veeam Availability Suite	*Comprehensive data protection and recovery solution. *Support for virtual, physical, and cloud-based workloads. *Automation capabilities for backup and recovery workflows.	*Requires licensing and ongoing maintenance costs. *Limited to Veeam-supported environments *May require additional components for certain functionalities.
IBM Resiliency Orchestration	*Centralized management and automation platform. *Supports multi-vendor environments *Scalable and flexible solution.	*May require specialized expertise for implementation and management. *Licensing and ongoing costs. *Integration complexities in heterogeneous environments

V. ISSUES AND CHALLENGES IN CLOUD DISASTER RECOVERY AUTOMATED SYSTEMS

A. Zerto Virtual Replication Network Connectivity and Bandwidth Constraints

Issue: Inadequate network connectivity or limited bandwidth can hinder the replication and transfer of data between the primary and secondary sites, leading to delays or failures in disaster recovery processes.

Solution: Implementing dedicated network connections or utilizing high-speed internet services can address bandwidth constraints. Additionally, optimizing data transfer methods, such as data compression and deduplication, can help reduce the amount of data transmitted over the network.

B. Data Consistency and Integrity:

Issue: Maintaining data consistency and integrity during the replication process is crucial for successful disaster recovery. However, network disruptions or system failures can introduce data inconsistencies or corruption.

Solution: Implementing technologies like data checksums and data validation mechanisms can ensure data integrity.

Replication methods that guarantee consistency, such as synchronous replication, can minimize data inconsistencies between the primary and secondary sites[12].

C. The Complexity of Configuration and Management:

Correspondence to: Pooja Varshney, Department of Computer Science and Information Technology, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: pooja.varshney@mygyanvihar.com

Issue: Setting up and managing a complex disaster recovery automation system can be challenging, requiring specialized knowledge and expertise.

Solution: Simplify the configuration and management processes by leveraging intuitive user interfaces, templates, and pre-configured settings. Providing comprehensive documentation, training resources, and support can also assist in addressing the complexity associated with the system.

D. Testing and Validation

Issue: Regular testing and validation of disaster recovery plans are essential to ensure the effectiveness of the automated system. However, conducting tests can be time-consuming and disruptive to production environments.

Solution: Utilize non-disruptive testing mechanisms, such as sandbox environments or isolated instances, to validate the disaster recovery plan without impacting the production environment. Automation tools can also facilitate the execution of regular testing routines and provide detailed reports on the results.

VI. EMERGING TRENDS

Emerging trends in cloud disaster recovery automated systems are shaping the future of disaster recovery and driving advancements in this field. There are so many trends and technologies that are been brought to innovate these systems , but here are some notable trends

A. Multi-Cloud and Hybrid Deployments

Organizations are increasingly adopting multi-cloud and hybrid cloud strategies for their IT infrastructure.

It is reflected in cloud disaster recovery systems, where solutions are being developed to support replication, failover, and failback across multiple cloud environments. This allows organizations to leverage the benefits of different cloud providers and enhance their disaster recovery capabilities[13].

B. Machine Learning and AI-driven Automation

Machine learning and artificial intelligence (AI) technologies are being integrated into cloud disaster recovery systems to enhance automation and decision-making processes.

Technologies that can analyze historical data, predict potential failures or disruptions, and automate recovery actions based on predefined rules or intelligent algorithms[14].

This trend improves the speed and accuracy of disaster recovery processes.

C. Orchestration and Workflow Automation

Orchestration tools are gaining prominence in cloud disaster recovery automation. These tools enable organizations to define and automate complex recovery workflows, including the coordination of various tasks, dependencies, and decision-making logic.

Orchestration simplifies the management of recovery processes and ensures consistency and reliability[15].

D. Ransomware Protection and Recovery

With the increasing threat of ransomware attacks, cloud disaster recovery systems are incorporating specialized features to protect against and recover from such incidents. These features include immutable backups, air-gapped storage, and rapid recovery options to minimize the impact of ransomware attacks and facilitate timely restoration of critical systems.

E. Data Analytics for Recovery Optimization

Data analytics techniques are being applied to disaster recovery systems to gain insights from historical data and optimize recovery processes. Analyzing recovery performance metrics, identifying bottlenecks, and refining recovery strategies based on data-driven insights can enhance the efficiency and effectiveness of disaster recovery operations.

F. Disaster Recovery as a Service (DRaaS)

DRaaS is a growing trend where organizations leverage cloud service providers' infrastructure and expertise to automate their disaster recovery processes.

DRaaS eliminates the need for organizations to maintain separate secondary data centers, hardware, and software. It offers scalability, cost-effectiveness, and simplified management of disaster recovery[16].

G. Immutable Infrastructure

Immutable infrastructure refers to the practice of deploying infrastructure components, such as virtual machines or containers, in a state that cannot be modified after creation. This trend is gaining traction in cloud

Correspondence to: Pooja Varshney, Department of Computer Science and Information Technology, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: pooja.varshney@mygyanvihar.com

disaster recovery systems, as it ensures the consistency and reliability of recovery environments and simplifies the rollback or recreation of infrastructure during a disaster.

H. Continuous Data Protection

Traditional backup and replication methods are being complemented or replaced by continuous data protection (CDP) techniques. CDP enables near-real-time replication and capture of data changes, reducing data loss and improving recovery point objectives (RPOs). This trend is particularly beneficial for organizations with stringent data protection requirements.

VII. RESEARCH METHODOLOGY

The purpose and objectives of this overview research paper on cloud disaster recovery automated systems are on the specific context and research goals.

A. Provide a comprehensive understanding

The primary purpose of this overview research paper is to provide a comprehensive understanding of cloud disaster recovery automated systems. It aims to give readers a broad overview of the topic, including its principles, methodologies, and key components.

B. Synthesize existing knowledge

This overview research paper seeks to synthesize existing knowledge and literature on cloud disaster recovery automated systems. We gathered information from various sources, such as academic papers, industry reports, and case studies, and presents a cohesive summary of the field's current state.

C. Identify key concepts and components

This research paper aims to identify and explain the key concepts, components, and technologies involved in cloud disaster recovery automation. We want to help readers grasp the fundamental principles and mechanisms that underpin these systems.

D. Highlight benefits and challenges

Another objective is to highlight the benefits and challenges associated with cloud disaster recovery automated systems. This research paper examined the advantages of automation, such as improved efficiency, reduced downtime, and cost savings, as well as the challenges related to implementation, security, and scalability.

E. Discuss best practices and emerging trends

This research paper explored best practices and emerging trends in the field of cloud disaster recovery automation. We discussed innovative approaches, cutting-edge technologies, and industry standards that are shaping the future of these systems.

F. Inform decision-making and strategy

This overview research paper aims to provide valuable insights and information for decision-makers, IT professionals, and organizations considering the adoption of cloud disaster recovery automated systems. It helps them understand the implications, benefits, and considerations associated with implementing such systems.

G. Contribute to the research community

This research paper contributes to the existing body of knowledge by summarizing and analyzing the current understanding of cloud disaster recovery automated systems. We identify gaps in the literature and suggest areas for further research and development.

Overall, the purpose and objectives of this overview research paper on cloud disaster recovery automated systems revolve around providing a comprehensive understanding of the topic, synthesizing existing knowledge, identifying key concepts and challenges, and informing decision-making in the field.

CONCLUSION

In Conclusion, we ultimately showed the role in which the cloud disaster recovery automated system play in cloud operating systems, their diverse difference, modes of operations, and how they are beneficial to us in this modern day and age, these automated systems have various systems and components which make them thrive from the varied forms of the cloud disaster recovery systems, and they are seamlessly easier manual operations to be done and this entails that they will be smaller margin for errors, as the user priority in the cloud disaster recovery, ifs for the recovery to meet the recovery point and time, which are the two keen segments to be noted ina cloud disaster recovery systems.

Correspondence to: Pooja Varshney, Department of Computer Science and Information Technology, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: pooja.varshney@mygyanvihar.com

We also evaluated the importance of these systems, and with the growing new trends and technologies, show there is still a significant ground on which these automated systems can be improved on, the better allow the ease of operation and delivery of recovery services, as most big companies who like to indulge in cloud recovery will prefer a less complex systems that can be easily manipulated, so as the technical know-how can be well spread within the company, but regardless to that the vices and computations for these automated systems are diverse and advanced, to meet most of the various needs and requirements, and is keenly advisable the best form of disaster recovery systems that should be employed by systems with critical data/information

REFERENCES

[1] Kruti Sharma, Kavita R Singh (2012) Online data backup and disaster recovery techniques in cloud computing; A review.

[2] Ke Huang (2013) "The Hydra: An automated disaster recovery solution for the cloud".

[3] Chang et al., 2018) Chang Y. C. & Kwang S. C. (2018) The Solution of Disaster Recovery System on Cloud Computing environment.

[4] Ganapati, N. E. (2009). Rising from the rubble: Disaster recovery in developing countries. International Development Planning Review, 31(1), 1-XII.

[5] IFRC. (2021). What is a disaster? https://www.ifrc.org/what-disaster

[6] Kabir, M., Farhana, N., & Akanda, M. G. (2018). Impact of disaster resilient housing units to reduce disaster risk in coastal area of Bangladesh. International Journal of Disaster Resilience in the Built Environment.

[7] Ronoh, S. et al. (2019). Examining a field-level decision space intervention for improving disaster readiness and resilience. Disaster Prevention and Management: An International Journal.

[8] Seneviratne, K. et al. (2012). A framework for resilient information systems for disaster management. Intl. J. Disaster Resilience in the Built Environment, 3(1), 8-22.

[9] Omar H. Alhazmi1 (2016): A Cloud-Based Adaptive Disaster Recovery Optimization Model.

[10] Shaw, R. et al. (2008). Indigenous knowledge and disaster risk reduction. Disaster Prevention and Management: An International Journal.

[11] Tran, P. et al. (2009). GIS and local knowledge in disaster management: a case study of flood risk mapping in Viet Nam. Disasters, 33(1), 152-169.

[12] Abedallah Zaid Abualkishik, Ali A. Alwan, Yonis Gulzar (2020) Disaster Recovery in Cloud Computing Systems: An Overview.

[13] Bamleshwar B., Rao1, Dr. Akhilesh A. Waoo2 (2018) Analysis of the Technique for Disaster Recovery in Cloud Computing Environment.

[14] Lenny Michael Bonnes (2018) AI Neural Network Disaster Recovery Cloud Operations systems.

[15] Eleni Gialinou, Christos Drosos, Michail, Papoutsidakis, K. Kalovrektis, (2019) "Study and Analysis of a "Disaster Recovery" Information System using Cloud computing Technology".

[16] Jasmin Azemović, Elmin Sudić (2014) "Comparative analysis of regular and cloud disaster and recovery systems".

Correspondence to: Pooja Varshney, Department of Computer Science and Information Technology, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: pooja.varshney@mygyanvihar.com