IRJMETS

e-ISSN: 2582-5208

International Research Journal of Modernization in Engineering Technology and Science

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

Volume:06/Issue:05/May-2024 Impact Factor- 7.868 www.irjmets.com

CLOUD DISASTER RECOVERY MANAGEMENT AND BUSINESS CONTINUITY

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DOI : https://www.doi.org/10.56726/IRJMETS57003

ABSTRACT

Cloud based disaster management and continuous business with cares about the organization's ability facing unexpected events that threaten the company's operations. As the cloud computing has become a useful tool to disaster recovery and business continuity, it is cost-effective and scalable platform through which critical data and applications can be stored and retrieved. This abstract summarizes the critical ideas and concepts on the topic of cloud disaster management and business continuity, namely cloud service providers, disaster recovery planning, and backup and recovery solutions, amongst others. Finally, the abstract points out that cloud-based disaster recovery and business continuity offer some of the advantages that include; increased flexibility, decreased downtime and better overall business' resilience.

Keywords- Cloud computing, Business and IT, Future of cloud technology.

I. INTRODUCTION

The cloud disaster recovery and business continuity means the technologies, policies and procedures of an entity which are employed to make sure that the entity IT systems and data are secured in case of disaster such as natural disaster, cyberattack or hardware failure. The objective of disaster recovery and business continuity is to mitigate the consequences of a disaster towards the organization's operations and to get back to normal with the recovery of vital systems and data. As cloud computing is becoming more and more significant, cloud disaster recovery and business continuity have emerged as vital aspects in the operations of IT for many institutions. Through the use of clouds with its scalability and flexibility attributes, organizations are able to create disaster recover and business continuity solutions that are tailored to their needs at a lower cost. In the a cloud solution for disaster recovery and business continuity system, the critical systems and have been replicated to the cloud where they can be quickly restored should a disaster arise. It contributes to minimization of downtime of the organizations and to be sure that their operations can proceed even when the primary IT infrastructure is unavailable.

II. LITERATURE REVIEW

Cloud platform for disaster recovery and business continuity is one of the key elements determining how organizations will deal with unexpected events and restore their regular organizational functions. The subsequent literature overview synthesizes essential resources and findings concerning cloud-based disaster recovery and business resumption.

1. Inhibited role of Cloud Service Providers in Disaster Recovery Management

Disaster recovery planning has been shown to be of great essence and some findings have proved that cloud service providers are critical. To sum up, according to what last we have mentioned by Li et al. (2018),disaster recovery services in form of data hosting, backup, cloud storage, and disaster preparedness solutions cloud service providers have become an important part for the organizations looking for disaster recovery, using the utility of a SaaS integration and a fast recovery time. The investigation also emphasizes the significance of the occurrence of a regular dialog and cooperation between the cloud service providers and their partners so that the recovery plans are updated and adequate.

2. Backup and recovery are the measures to ensure disaster resistance and resilience in cloud services.

On-demand backup and recovery systems have been classified as a credible system that allows sustaining the business operations even with the occurrence of a disaster. What Zhou and others (2018) say is that cloud backup and recovery solutions allow you to be more flexible and to have the capacity to grow your business and can be different from the traditional backup and recovery solutions. In addition to this fact, the paper also describes the key aspect of choosing the cloud service provider with the strong recovery system and backup infrastructure.

3. Tests and Control Measures about Disaster Recovery in the Cloud Computing.

Resiliency of cloud based disaster recovery models depends on efficient testing and monitoring plans that are used in parallel. Research supports the notion of routine monitoring and examination of the cloudbased disaster recovery solutions by companies that allows the detection of probable problems before the business operations are hit by them, as per (Chen et. al., 2020). As well as that, the investigation emphasizes the role of choosing the correct means to be tested and controlled to provide a high confidence that all the elements of the disaster recovery procedures are tested as required.

4. Benefits of Cloud Disaster Recovery and Business Continuity are Certainly Impressive and Worth Implementing in Any Organization.

Numerous surveys conducted showed the efficiency of employing cloud-based disaster recovery and business continuity strategies. As Lai and Wu (2020) put it, the cloud-based disaster recovery services are responsible for enhancing the flexibility, provide for lower downtimes, and boost business resilience. In addition to this, the study draws attention to the money-saving possibilities of the network-based recovery technologies.

In general, this literature review draws attention to the critical necessity of cloud-disaster recovery and business continuity when we talk about the capacity of organization to operate in the presence of unexpected shocks. It also stresses the essential role of cloud service providers in the disaster recovery planning, implementation of backup& recovery in the cloud, effective testing and monitoring security procedures, and higher utilization of cloud for disaster recovery& continuity of business needs.

HISTORY & EVOLUTION OF CLOUD COMPUTING

Cloud computing is a new-tech phenomenon. It all began in the 50s' : This decade marked the beginning of mainframes, which had high-capacity processing power and were used on an industrial scale. In order to act more efficiently mainframe computers, the approach of time sharing, which is an integration of all the resources, had born. Users connected to the mainframes via their terminal resources, which were configured to serve as unique clients, toward the same element of data storage and CPU power.

Along with Virtual Machine operating system launching in the 1970s, a single physical node could run multiple virtual machines at once using mainframes. One of the biggest changes on the operating system level was the virtual machine that was developed from the shared access on a mainframe application of the 1950's. With a multi-virtual machine platform, several independent computing environments can be created and executed on the same physical hardware.

Actually, every machine had its virtual guest operating systems that were treated individually. So, each system received its memory, CPU, and hard drives' resources as other systems did. Therefore, virtualization progressed to be pegged as a prominent determinant of progress and a pivotal impetus for some of the most remarkable achievements within communications and computing. The growth of the net and human desire to save hardware expense resulted in servers being consolidated into shared hosting environments, virtual private servers and virtual dedicated servers, all of which rely on same mechanisms as the virtual machine operating system. A hypervisor is a little software layer which helps the placement of multiple operating systems on top of one another and share actual physical computing resources among them. Hypervisor is another situation where different Virtual Machines are separated by slicing all underlying computing power, memory and storage space to each one exclusively so that they don't affect each other.

III. METHODOLOGY

3.1 Business Continuity

Disaster recovery is the term for the systems, policies, and technological processes set in place to guarantee that a company's vital operations and systems can run when a disaster, i.e. a natural disaster, cyber-attack or hardware failure, takes place. The main objective of business continuity planning is to reduce the aftermath consequences of a catastrophe on the operations of a certain business, and to make sure that emergency systems and needed data are restored in a timely manner.

The business continuity planning generally focuses on developing a detailed plan that provides as shows the needs of a company, highlights the possible risks and lists what particular procedures and technologies should be utilised in the event of a disaster. The plan also incorporates frequent testing as a way of measuring its efficacy and constituting something that can be used in real time in the actual environment.

As business interruption procedures are multifaceted, these include disaster recovery, risk management and crisis management. Disaster recovery, on the other hand, tries to restore operational data and systems in case of a failure, whereas risk management involves identifying risks or potential threats to organization's functioning. The society of Crisis Management deals with managing a disaster and making sure that people and resources are in the right place to timely and appropriately respond to this.

A business continuity plan (BCP) is an document in which the major emergency preparedness actions of an organization during and post a severe interruption to its normal business is outlined. The focus of a BCP is to decrease the business influence during the occurring of an interruption, whether it is because of a natural event, a cyber attack, a pandemic or any other factor which may break the ability of a business to run its business. ABCP usually allows to perform risk assessment including identification of the threats that could negatively affect the organization, what is their impact and probability of occurrence.

Figure 1: Business Continuity model

3.2. Disaster Recovery

Disaster recovery (DR) - the process of restoring the normal operations after the damaging event which include natural disasters, cyberattacks or pandemics. Disaster recovery forms a part of the business continuity plan and usually deals with restoring the business's critical systems and data within the least possible time and in a manner that's most optimal.

Disaster recovery planning is an ongoing process which also involves continuous testing, monitoring and review to keep disaster recovery capabilities of any organization up to date and efficient. Disaster recovery is to minimize the effect of a disruption and a business can move back to its normal/expected operations level as soon as possible. An organization that has a prepared and tested disaster recovery plan can mitigate the financial loss, save reputation of the company and, in the long run, ensure the survival of the company. A Disaster Recovery Plan (DRP) is a documented roadmap that depicts the procedures for an organization to restore normal operations following a disturbing incident like a cyclone, cyberattack, or pandemic. The main goal of the disaster recovery plan is to minimize a disaster impact on an organization and its ability to operate its mission-critical functions in a short and timely manner.

Having a disaster recovery plan that is well-established and tested is of utmost importance for the continuity of its business and the reduction of financial losses and risks of negative reputation of your organization, after a disruptive event.

Figure 2: Disaster Recovery

3.3 Business Continuity and Disaster Recovery in Cloud Computing(BCDR)

In its turn, cloud computing can drastically increase business continuity and disaster recovery as it is able to give enterprises a convenient, scalable, and low-cost infrastructure for protecting core systems and data. undefined

Scalability: Organizations can leverage cloud computing for its flexibility in terms of rapidly and effortlessly adjusting their IT infrastructure as per the process, thus allowing them to respond quickly to changing business needs and adverse situations (whether disasters or crisis).

Flexibility: Through the cloud computing solutions, organizations now have the ability to store their critical systems on the cloud, which implies that they can now access such systems from anywhere with an internet connection at hand. This thus simplifies the issue of rescuing and safekeeping of vital systems. Cost-effectiveness: Clouds can deliver a number of cost-effective solutions like disaster recovery and business continuity to organizations, thus, reducing the cost of infrastructure and storage by the sharing of it among many organizations.

Automated backups: With cloud computing, automatic synchronization of critical systems and data can be easily done to ensure that they are kept accordant in an event of disaster.

Geo-redundancy: Placing critical systems and data in various places for cloud computing not only eliminates the risk of local disasters such as regional emergencies but will also enhance organizational security to a great extent.

Improved disaster recovery times: Though downtime is still possible, cloud computing reduces the number of hours needed to restore business operations since mission critical systems and data could be recovered from the cloud.

Easy testing: The cloud computing enables organizations to test such disaster recovery and business continuity solutions because the cloud providers make it easy for it to create test environments in the cloud.

Essentially, cloud computing gives companies facilities that are flexible, scalable, and economical for delivery of uninterrupted services particularly in cases of disasters. Utilization of the latest trends in cloud computing allow companies to get their critical systems and data safely secured.

3.4. Disaster recovery strategies and Business Continuity strategies must include (BCDR) cloud solutions

3. 4.1. Infrastructure as a Service(IaaS):

The service of infrastructure (IaaS) which is a very highly effective tool of disaster recovery gives the possibility to the organizations to restore their IT infrastructures immediately and efficiently in the case of an accident. IaaS deploys a mode whereby an organization copies its management of the infrastructure to a cloud service provider who can then offer the needed computing resources, storage and network facilities on demand. Resiliency in disaster recovery and traditional replication techniques that utilize IaaS as the underlying infrastructure offer more flexibility than what subsystems available give, while at the same time being scalable to meet any changing environment. Relevant organizations can stand by with the necessary extra resources needed for the job quickly, they do not necessarily have to purchase additional hardware or infrastructure. This feature provides disaster recovery environment in a very short time also reduces the cost of setting up.

Just like IaaS makes the disaster recovery process more adjustable, IaaS can enable organizations to have a greater dominance over their disaster recovery environment. Organizations can tailor individualized patterns of their architecture to suit their demands and can effortlessly simulate and alter their emergency plans in due course. Simply put, IaaS is of significant importance because it can deliver organizations with an enhanced level of security and data protection.

In conclusion, the role of the media in shaping perceptions and defining elections cannot be overlooked. It is common that cloud service operators use in their infrastructure and its database highly advanced security methods like encryption, multi-factor identification, and intrusion detection and prevention systems so as to protect them. This will make invaluable that essential data and programs are protected if the incident occurs.

3.4.2. Disaster Recovery as a Service (DRaaS):

Disaster Recovery as a Service (DRaaS) is an essential cloud-based service that seeks to provide organizations with a rapid and economical way to restore vital computer networks and data in case of a disaster. DRaaS is intended to help businesses to reach their defined objectives of DR operation through provision of cloud-based infrastructure, data storage, and recovery services undefined.

1. Data protection: The provider of DRaaS keeps doing backup of the customer's essential data and applications to secure, cloud-based data centre.

2. Testing and validation: The DRaaS vendor routinely conducts DR testing of the customer's DR environment to make certain that the environment is working properly and the customer's data is recoverable during an emergency.

3. Recovery: In case of emergency, the DRaaS provider will set the customer's DR environment in motion and resume the operation of the critical systems and storage in a highly uninterrupted way.

The use of DRaaS is becoming more and more commonly used by organizations that want to enrich their disaster recovery capacities and also avoid financially loss and reputational damage following the incidence of disruptive events. Yet, the whole process of selecting a DRaaS solution must be carried out carefully examining a provider's reputation, security regulations and service level agreements (SLAs). Taking into account such a trusted DRaaS supplier, companies will be having in place the dependable and efficient failover plan for their disaster recovery.

3.4.3. Backup as a Service (BaaS):

As a Service (BaaS), is a cloud backup solution which securely saves the critical data of an organization in a note of safe distant location. The backup process is controlled by the third party provider that ensures the availability of customer data by storing it in accordance with the scheduled time, testing and the security measures.

If disaster strikes and, say, the customers' data gets lost or corrupted, the provider will still be able to bring it back to life, which means they do not necessarily have to suffer all the disruptions to their usual rhythm.

The salient benefit of the BaaS is that it holds the organizations of the responsibility from organizing and managing their backup infrastructure. It can decrease the costs in the process of data backup and recovery, and it can also reduce the risk of data loss if it happens to be due to hardware failure or other disasters that might occur onsite. Furthermore, most BaaS providers deploy highly secure protocols, hence customers can entrust their data security to the providers anytime knowing their data is protected both during backup and recovery.

The BaaS suitability can be used by all types and size of industries including, healthcare, tech, retail and finance. Nonetheless, when the BaaS solution is being reviewed, considering the reputation of the provider, security measures and service level agreements (SLAs) should be given a careful thought. Through combining IT resources with the services from a reliable BaaS supplier, an organization will be able to prevent information loss in case there occurs some disaster.

IV. COMPARING DAAS AND BAAS CLOUD SERVICES

Table 1

Aspect	Disaster Recovery as a Service (DRaaS)	Backup as a Service (BaaS)
Objective	To restore critical systems and data after a disaster.	To create a copy of critical data for recovery in case of data loss.
Recovery Time	Typically measured in hours or minutes.	Typically measured in days or weeks
Recovery Point	Typically aims to minimize data loss, with recovery to a recent state.	Can be any point in time, depending on the frequency of backups.
Scope	Entire systems or applications may be restored.	Typically focuses on specific data sets or

		applications
Costs	Higher costs due to the need for dedicated infrastructure and testing	Lower costs, as it may use existing infrastructure and be less complex
Testing	Frequent testing is critical to ensure effective disaster recovery.	Testing may be less frequent, but still important for data recovery.
Business Impact	Critical to minimizing downtime and maintaining business continuity.	Important for minimizing data loss and mitigating the impact of data loss.

V. RESULTS AND DISCUSSION

As per the survey of IDG, 72% of the companies have some concept of the disaster recovery plan. On the other hand, 46% of the companies using cloud-based disaster recovery solution is something remarkable. After the report in the Disaster Recover Planning Council, 20 percent of organizations have coped with the disaster for the past five years, and 80 percent of those organizations experience the downtime or data lost. Research findings by Institute have determined that on average a business in the middle of downtime spends about $5,600 dollars per minute. In accordance with survey conducted by Disaster Recovery Journal 38% of organizations finding cloud-based disaster recovery the most efficient way for recovering from disasters was reported. The world forecasts that not only the cloud technology stimulates growth in the disaster recovery market but enables it also to develop further. Such as, about $12 billion in 2020, will turn into $ 7 billion by 2013. Statistics showed that 82 billion growths in size will be happening till 2025 showing a 29% compound annual growth rate (CAGR) rate. 2%, according to Market.

With the Disaster Recovery Journal surveying organizations and them responding with 46% majority said that they are planning on ramping up their spending on cloud-based disaster recovery in the next year. Gartner survey found that 72 percent of businesses whose response to disasters is cloud-based are happy with their solution. These statistics point out that almost all companies with data on the cloud have either suffered from some sort of breach or have lost a considerable portion of their income to the hackers, and therefore the cloud disaster recovery solutions are becoming increasingly popular and effective, and many organizations are now investing in them to protect their data and to minimize the downtime in case of a disaster.

VI. CONCLUSION

At the end of the day, the core of any good IT strategy includes both cloud disaster recovery and business continuity that lead to reassurance that the systems and data are kept secure in event of the disaster. Using cloud computing features, businesses establish efficient, flexible, and scalable disaster recovery and business continuity models which fit their peculiarities.

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