**CHAPTER 3: PROBLEM STATEMENT**

**3.1 INTRODUCTION**

In Chapter 3, Problem Statement and Proposed Approach are pursued for throughout work and these topics are mainly covered in this section.

1. The Research Problem Statement under consideration.
2. The Proposed approach to provide a solution of Problem Statement.

**3.2 PROBLEMS WITH THE EXISTING APPROACHES.**

Cloud computing is an approach to deliver the computing services to an individual or an organization over the Internet connectivity as their own user / organization requirement. Nowadays, users and organizations are not interested, nor on their priority to invest a lot on establishing the Information Technology infrastructure of its own, instead of it, there are willing to lease the software and hardware services from a third party for best services and their uses due to third party maintenance on their best. The third party is responsible for providing computing services with security, efficiently and effectively without any delay or downtime at their best.

In today’s Information Technology world, it seems like every new IT headline has something about crash of data centers of cloud provider or data loss / data corrupt due to any disaster (Naturally or Manmade) in the coming years as time-to-time changes in the atmosphere of world. The situation is also becoming worse in Pakistan as terrorist attacks, cyber attacks and natural or manmade disasters increase in their ratio.

A disaster may occur at any time, at any location of the world, which may destroy the complete IT infrastructure or whole data centre in a one go. Many different disaster recovery planning models; use by the organizations to overcome the effect of disaster and to recovery from disaster as soon as possible without affect the normal operations of organization. Cloud computing provides a many solutions for disaster recovery by implementing virtualization also.

The problem arises, when an organization uses private cloud as cloud deployment model. Because, focus of comparative analysis is cloud-computing adoption in Pakistan, which is not up to the world standards and mainly private cloud computing deployment models are deploy also in different information organization of country recently. Therefore, organization is not willing to share their data over the Internet. In this case, when a disaster hits the private cloud infrastructure site, then how to recover from this situation is a big question.

Therefore, it also observed that in some private organization different disaster prevention models or method are implemented as well to protect essential information and also to diminish the server downtime during unexpected disaster (Naturally or Manmade). However, no method or model provides an output, which is efficient, cost effective, reliable and efficient with all respects and always compromise on crucial information of an organization as this is situation is a nightmare for all companies as mainly all were fail to protect user data from any disaster.

Until now, many disaster recovery solutions / approaches / method / models for cloud computing exists, but no one provides a reliable, efficient, cost effective and efficient with all respects.

**Comparative analyses of existing approaches, methods, models are;**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr #** | **Approaches** | **Advantages** | **Disadvantages** |
| 1 | High Security Distribution and Rake Technology (HSDRT) [23]  **(Yoichiro Ueno *et al*, 2010)** | * Best used for movable clients and mostly applicable for moveable devices like laptop, Smart Phones etc. | * Always, increase high redundancy. * Costly / Expensive, due to High Implementation cost. |
| 2 | Parity Cloud Service (PCS) [24]  **(Chi-won Song *et al*, 2011)** | * Economical, low / less Implementation Cost. * Reliable Service Provided. * Always, Highly Privacy provided. | * High Complexity   in implementation |
| 3 | Efficient Routing Grounded on Taxonomy (ERGOT) [25]  **(Giuseppe Pirr´o *et al*, 2010)** | * Fast & Perform Exact Match Retrieval. * Highly Accuracy & Privacy to Data | * High Time Complexity * High implementation Complexity & Required More Time |
| 4 | Linux Box [26]  **(Vijaykumar Javaraiah et al, 2011)** | * Simple * Low cost or Economical * Implementation is Simple | * Always, Requires High bandwidth (waste bandwidth) * Privacy * Complete Server backup at same Time. |
| 5 | Cold /Hot Back-up Strategy [27]  **(Lili Sun *et al*, 2011)** | * Services Triggered only, when failure occurs | * Cost increases as data increases gradually or step by step. |
| 6 | Shared backup router resources (SBBR) [28]  **(Eleni Palkopoulouy *et al*, 2011)** | * Concerned with Cost reduction and focus it on Economical way. * Always, Works even if router fail | * Incapable to add as optimization concept with cost reduction * Inconsistency between logical and physical configurations, it may lead to some performance problem. |
| 7 | Rent Out the Rented Resources [29]  **(S. Malik, F. Huet *et al*, 2011) &**  **(A. Celesti, F. Tusa et al,2010)** | * Virtualization, rents it to the cloud users / client in the form of cloud services. * Cost depends on the infrastructure utilization by client. | * Implementation always gets Complexity * Resources must keep under a special notice always due to rented concept. |

**Table 1: Comparison of disaster recovery existing methods**

As, there are above study indicates that regardless of various approaches and techniques are exist and these techniques tried to cover different issues, yet it shows after comparative analysis that effective disaster management is not fully achievable and each one of the backup or disaster recovery solution in cloud computing is unable to achieve all the aforesaid.

**3.3 NEED FOR A NEW APPROACH**

The main objective of this research is to develop and implement a new fully functional disaster recovery system, model or method for Cloud computing which provide 100% output results. Therefore, it is important to understand the existing disaster recovery approaches and their pros and cons.

Because, it is vital and necessary for all cloud service providers either (Pakistani’s or internationally) need to provide faultless services to their customer or cloud users always even if their servers are down due to any disaster.

So in the first phase of this research a detail comparative analysis has been providing for future researcher to develop a new approach based upon previous existing approaches. Each approach has its own pros and corns. However, unfortunately not a single existing approach completely fits in the perspective of Pakistan that provides better RPO, RTO, TTO, Cost and Security. Occurrences of disasters in Pakistan; is also very common, which may hit a large area in one go. Therefore, there is a need of a new approach, which caters the disaster recovery solution for private cloud computing in Pakistan to reduce the total service outage time.

This new propose approach should also need to reduces the cost of the solution and not only protects data from both disasters (Natural or Manmade), but also makes the process of migration from one cloud service provider to another service provider much simpler according to available resources. This proposed solution also need to eliminates consumers dependency on the service provider and eliminates the associated data backup cost and all services.

At the end, the performance of new propose approach is examined on some parameters; Recovery Time Objective, Recovery Point Objective, Test Time Objective Cost and Security.

**3.4 SUMMARY**

In this chapter, we have discussed the difference between various approaches, techniques to the problem or issue we arise. Therefore, highlights all the shortcomings in these approaches and the need for a new approach.