

Cloud Directory Services

Simranpreet Kaur

Asstt. Prof

School of Computer Science
and Engineering

Lovely Professional University,
Phagwara, Punjab, India.

Simranpreet.24915@lpu.co.in

Pawandeep Kaur

Asstt. Prof

School of Computer Science and
Engineering

Lovely Professional University,
Phagwara, Punjab, India.

Pawandeep.23808@lpu.co.in

Gunseerat Kaur

Asstt. Prof

School of Computer Science and
Engineering

Lovely Professional University,
Phagwara, Punjab, India.

Gunseerat.22157@lpu.co.in

Abstract

Access to the information and resources pertaining to the communication technology is provided by an emerging scheme called identity and management. Besides this, it offers numerous solutions for storing identities. Today, make-as-you-go models are used to administer identity management infrastructure. It has grabbed attention of the researchers owing to its presence at the central level in the technological world. Prime focus of the paper is: Firstly, on elaborated understanding of director services which forms the backbone of identity and access management. Secondly, how Directory-as-a-service is a promising solution in the field of cloud-based directory services.

Keyword: cloud directory services, directory-as-a-service, cloud, security, identity management.

I. Introduction

In spite of having myriad of advantages of cloud computing, organizations are hesitant to trust the cloud. This is owing to the security threat to the data residing in cloud. The risks and challenges in cloud computing has paralysed the growth and global acceptance of cloud. Apparently, management of identity credentials in such an environment which uses multi-tenancy and distributed approach is worrisome for organizations.

Objective of Identity Management is to provide access to the right entities at the right time to the right resources. At the same time, it is ensured that identity of user is secure by keeping check on user's identity and curbing unauthorized access to critical data in cloud environment. In the world of identity and access management, cloud directory services have been successful in making a shift in the thinking process of IT admins for IT infrastructure. This has lead to the emergence of Directory-as-a-service, which has catered to the requirement of modern organizations where the base is mix-platform environment, web applications etc. Directory service offers a focal point from which different network services could be located [1].

Paper is organized as follows: section II describes cloud directory services and its features and benefits, section III puts forth Directory-as-a-service and section IV concludes the paper.

II. Cloud Directory Services

IT resources needed to be accessed by users are connected by central servers established by cloud directory services. Virtual directory identities are the vital part. These services do not discriminate between major platforms as well as providers. These services are not only secure but highly available also.

Modern cloud directory services are:

- Microsoft Azure Active Directory (AD): It provides thorough solutions for identity management. In order to manage divergent groups and users, it merges core directory services, and advanced identity and access management competency. It also provides user-friendly as well as secure access to on-premise and cloud applications. It helps developers to consolidate identity management solution and applications, which aids the organizations in cutting down the cost [2, 3].
- Amazon Web Services (AWS) Directory Services: It helps to furnish directories to accumulate information pertaining to the organization, users etc. It allows organizations to concentrate on business solutions rather than being involved with management tasks. Besides this, all software update, replication of critical data is handled by Amazon. These services aids in establishing connection of AWS resource with pre-deployed on-premise directory infrastructure. After creating of directory, single sign on could be used to manage user's access to the applications and services.

A. Difference between Cloud Directory Service and Microsoft Active Directory:

The most obvious dissimilarity is that cloud identity provider is cross platform and on the other hand side AD is predominantly dependant on Windows devices and applications.

Additionally, there are some inherent assumptions in AD which could not be overlooked. Firstly, when AD was formulated a few decades ago, IT world was quite distinct from today. AD was positioned on LAN, where IT resources were under direct administration of domain controller, thus, leading to belief that all

resources are going to be linked directly to AD. AD was placed on the internal LAN, and users and IT resources were local to the domain controller. As a result, there was an assumption that every resource would directly connect to AD. This led to the generation of VPN connections being used to connect to the network for remote access. Secondly, as per the assumption AD is not supposed have notable security checks, it would be protected by intrusion detection systems. Certainly, if a malicious attacker is successful in going past the security checks then the whole organization is vulnerable to security breaches.

Cloud directory services incorporate different approach which believes that Modern IT organizations are not in possess of a network. Besides this, their “network” is nothing more than an accumulation of IT resources positioned anywhere in the whole wide world. The connection of user with these IT resources is ought to be secure.

Security is an integral part for cloud directory where passwords are strong. In order to ensure security, hashing is used.

B. Replacing Active Directory:

Since 20 years, IT industry is adapted to function with two directory services named as OpenLDAP and Microsoft Active Directory. Even though OpenLDAP has gained quite prominent, it is not put into use as predominantly as compared to the identity provider for an organization. On the other hand, Microsoft AD had major usage in on-premise directory services owing to the fact that most devices were using Microsoft windows. As and when IT industry deviated, Linux and Apple Mac gained attraction, applications became fundamental and users became mobile. At that time, it became obvious that to keep AD, there was dire necessity to bring-in numerous third party solutions to make up for the holes.

There were other organizations that preferred shifting to DaaS rather than applying patched in AD. There were skeptic identity providers who believed in making using heterogeneous approach by moving identity management to the cloud. In this way, all prime platforms would be considered as equals rather than being discriminated. Major help was provided to the IT resources when central directory services were established in the cloud which further supported diverse protocols.

C. Benefits of cloud directory services:

Figure 1 depicts myriad of advantages of cloud directory services [2].

Security for IT

- It is ensured that resources belonging to the organization are only accessed by those who require them. Traditionally, various directories were used to manage it. This further led to hefty amount of work for IT and also made it prone to compromises. So, cloud directory service not only increase the security but also minimizes the work effort of IT.

Avoid lock-in

- Unfortunately in the past, directory services were locked in with microsoft windows platform. Now-a-days, IT industry is deviating from one vendor environment as they desire not be restrained in terms of management and control through directory. Undoubtedly, Directory-as-a-Service furnish them with the facility to experience virtual environment and manage user access.

Cost effective

- Cloud directory services are cost effective unlike the previous days when IT admins had no choice but to stick to their vendor and bear the cost charged to them.

Frictionless access for end users

- It has become increasingly important that users are provided access to IT resources they require. Moreover, it is required that the access be secure. For this, single sign on approach is best suited.

Figure 1: Benefits of cloud directory services

D. Reliability and Security of cloud directory service:

It is clear that the main feature of cloud directory services is their resiliency and availability. In the vent of failure of internet connection, certain techniques are deployed to survive. A very good example is that authentication services are tremendously resilient owing to the fact that the whole process is under local management. This is in contrast with on-premise scenario where authentication is of possible if directory server failure occurs [2,3].

Security is a fundamental feature for virtual identity provider. Strong encryption techniques are implemented for communication. Besides this, penetration testing, segmentation, forming security groups etc. are some of the other security measure put in place by cloud directory service. Additional focus is given on security by IDaaS as identity management service in cloud is hosted.

In an event of internet being down, it becomes highly important that a lightweight agent be installed on a user system making it possible for the user to have an access to their device. This provides resiliency to the system.

III. Directory-as-a-Service for Identity and Access Management

Authorization of user, Authentication of user access and management of all devices in organization is done by directory. Any requirement of user pertaining to applications, resources or services is catered to by a directory. Dominantly AD and OpenLDAP are the prime providers but these services are hard to realize efficiently when implemented. Consequently, there are escalating demands for creating central user directory which would remove the hassle of IT admins to maintain directory services. In today's era, identities are gaining more and more vitality, thus, the requirement of protection of identities has given birth to Identity-as-a-Service (IDaaS). It is basically an offering of SaaS for using single sign-on. IDaaS could be incorporated with pre-existing directory or with the services extracted from cloud based user directory [4].

Directory-as-a-Service (DaaS) is a user directory service solution furnished on SaaS model. This solution efficiently caters to the intricate issues of authentication, authorization and central management. Overall, DaaS is a user directory that aids an organization in taking benefit of cloud based business model to a sole master directory, at the same time, using protocols like SAML, LDAP etc for communication. Moreover, it is ensured that IT resources are effectively maintained.

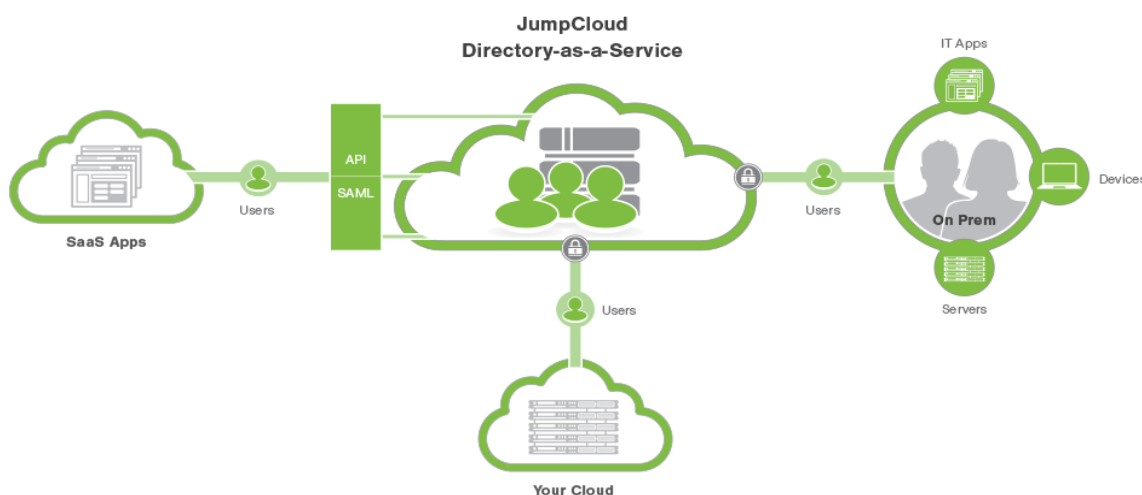


Figure 2: Directory-as-a-service [1]

- **Need of Directory-as-a-Service:**

Absolute examples of users benefitting from the cloud are the organization of modern era, because there is a need to have centralized access to not only manage but also to control user access. Even though migrating to the cloud gives a solution to majority of problems but it paves way for new problems as well. For an example, cloud servers purposely hosted on service providers like AWS are challenged for their on-premise directory solutions. These problems are well handled by DaaS [5].

IV. CONCLUSION

Cloud directory service is a tremendous add-on to IT organizations and their infrastructure. Undoubtedly, potential of cloud computing has attracted the organizations to move from self-hosted environment to cloud hosted environment. Moreover, it has successfully provided various advantages like availability, resiliency, cost-effectiveness, scalability. DaaS has empowered the organizations to position their users in one core and at the same time, have secure user management.

References

- [1] Onelogin, “Choosing the Right Active Directory Integration Framework for your Cloud Application Portfolio”, White paper, April 2014
- [2] Banday, M. T., & Mehraj, S., “Directory services for identity and access management in cloud computing”, 3rd International Conference on Applied and Theoretical Computing and Communication Technology (iCATccT), IEEE, December 2017, pp.334-337.
- [3] Bernd Zwattendorfer, Klaus Stranacher, and Arne Tauber, “Towards a Federated Identity as a Service Model”, Springer International Conference on Electronic Government and the Information Systems Perspective, 2013, pp 43-57.
- [4] Onelogin, “Choosing the Right Active Directory Integration Framework for your Cloud Application Portfolio”, White paper, April 2014
- [5] Sharma, Deepak H., C. A. Dhote, and Manish M. Potey. "Identity and access management as security-as-a-service from clouds." *Procedia Computer Science* 79,, pp. 170-174, 2016
- [6] R. Velumadhava Raoa, K. Selvamani, “Data Security Challenges and Its Solutions in Cloud Computing”, Elsevier, pp. 204 – 209, 2015.
- [7] Nitin Nagar, Pradeep k. Jatav, “A Secure Authenticate Framework for Cloud Computing Environment”, International Journal of Advanced Computer Research, vol. 4, 2014.