

CRBS-An Architecture for Accessing Location Based Services (LBS) in Cloud

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Abstract. Cloud computing is the emerging technology which emphasizes commercial computing. It is a new kind of advanced technology has brought opportunities to many fields. Cloud Computing is the use of computing resources that is delivered as Services over a network. The Services may be hardware or software. Cloud is a platform providing dynamic resource pools, virtualization and high availability. Cloud is implemented to overcome the regular computing problems like availability of hardware, software resources and other related aspects. Cloud computing provides anytime / anywhere services that can be accessed from any device and Cloud service provider will take charge for usage only similar to metering pattern. Cloud Services are designed to provide easy, scalable access to applications, resources and Services which are fully managed by a Cloud Service Provider. Location Based Service (LBS) is a Service that determines the Location of a device to provide functionalities and information specific to that Location. It is possible to satisfy Location based requests like finding areas of interest viz nearest hotels, bank, emergency requests etc. The combination of Cloud Computing and LBS bring high availability and efficiency to users who are all using LBS. In this paper, architecture is proposed named as Cloud Restaurant based Services (CRBS), which will help to improve efficiency and availability of LBS in Cloud Environment.

Keywords: Cloud computing, cloud service provider, cloud services, LBS, CRBS

1. Introduction

A mobile device provides different kinds of services to mobile users. In that, Location Based services (LBS) is one of the main services and it plays a vital role to the mobile users. LBS is a Service that determines the Location of a mobile device and uses to provide functionalities and information specific to that location. LBS is an information and entertainment service, accessible with mobile devices through the mobile network and utilizing the ability to make use of geographical position of the user. Mobile phones are becoming popular and its growth and services are also increased day by day. With the increasing capability of mobile phone, many companies offer LBS to mobile users such as Google maps and four square. LBS services can be used in variety of contexts, such as Road mapping, nearest hotels, ATM, bank, restaurant etc. So, LBS has become one of the top services in mobile communication compared to other services, such as, Google Maps

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and Four Square. Although the demand for LBS is continuously and rapidly increasing, their growth and proliferation are still limited due to some efficiency, availability and security concerns [1].

2. Process of LBS

LBS is defined as context aware service that utilizes the location of the user to adapt the service accordingly. Figure 1 represents the overview of LBS process. When a user requests a service from the mobile phone, the request goes to the nearest base station. From the base station, it goes to the Location Service Provider (LSP). LSP searches the user request from the Location Service Provider database and then sends the response to the mobile user through the base station. Suppose if the requested query is not stored in the LSP database, LSP search the location according to user request. User current location information's are stored in the Location Service provider database. So the main components involved in LBS are mobile phone, communication networks, Location Service Providers and positioning techniques like Global Positioning System (GPS), Global Information System (GIS), etc. [2].

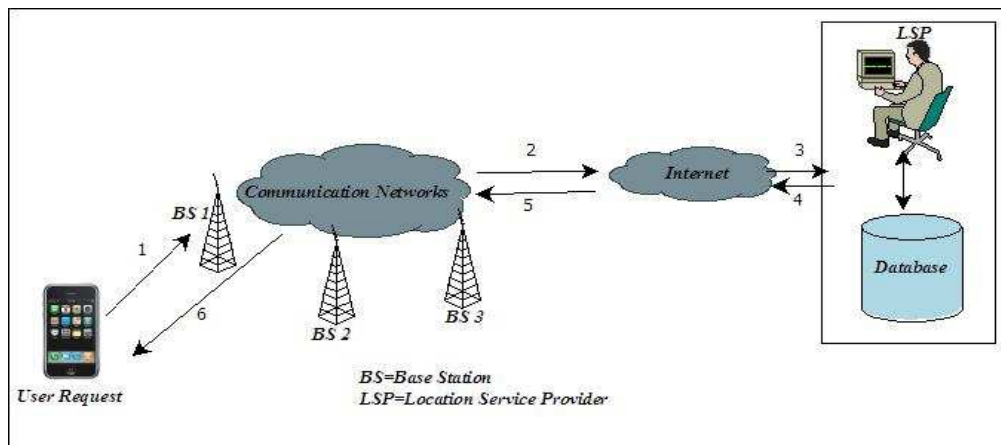


Figure 1: Process of LBS

3. Related works

Many Researchers contributed their work in LBS to provide services. Gurjeet et al.[3] proposed a access control technique for LBS using Cell-id positioning techniques. The objective of this work is to overcome unauthorized access. Palukuri et al. [4] proposed a framework for mobile LBS. Rashmi et al. [5] proposed a peer to peer spatial cloaking architecture on Road networks for improvement in enhanced privacy protection. The objective of this work is to provide a privacy protection for the query processor through the peer to peer spatial cloaking architecture. The main disadvantage of this work is that they proposed Spatial Cloaking architecture for Road networks. Luqman et al. [6] developed architecture for world known historical place Melaka. The Melaka Tourism Location Based Service is delivered to support tourist activity to find any nearby venue around their current location. Luqman developed architecture for Melaka tourist urban area. Priyanka Shah et al. [7] developed Location based remainder for Android mobile using Global Positioning System (GPS). However, this work is only focused on creating

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the LBS remainder for android mobile. The Literature reveals that LBS require efficient environment to provide services to users.

3.1. Main result-2

Nowadays, Cloud Computing is a new kind of advanced technology that brought many opportunities to different fields. Cloud Computing is the use of Computing Resources, which is delivered as a services over a network. The Service may be a hardware or Software. Cloud is a platform, which provides dynamic resource pools, virtualization and high availability. Cloud computing provides anytime / anywhere services such as Google and Amazon EC2 that can be accessed from any device. Cloud Services are designed to provide easy, scalable access to applications, resources and Services which are fully managed by a Cloud Service Provider. So, Cloud service provider will take charge for usage only similar to metering pattern. Cloud computing provides anytime / anywhere services that can be accessed from any device. Cloud Computing provides three different types of services namely, Software as a Service, Platform as a Service, and Infrastructure as a Service. Figure 2 depicts these three different Services [8].

3.1.1. Types of services

SAAS: It is run by cloud service provider and mostly used by organizations. It is available to users through internet.

PAAS: It is a tool (Windows, LINUX) used by developers for developing Websites without installing any software on the system, and can be executed without any administrative expertise.

IAAS: It is operated, maintained and controlled by cloud service providers that support various operations like storage, hardware, servers and networking.

There are four types of cloud computing models listed by NIST (2009) private cloud, public cloud, hybrid cloud and community cloud [9].

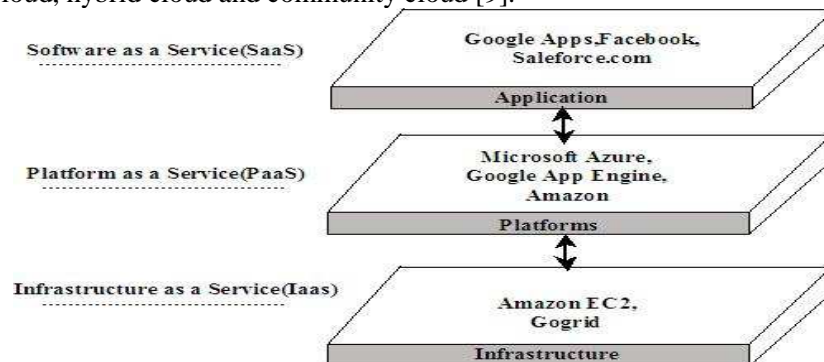


Figure 2: Cloud services

3.1.2. Deployment model

Cloud provides four types of deployment model to public. The Clouds are Public, Private, Hybrid and Community.

Public Cloud: It is for the general public where resources, web applications, web services are provided over the internet and any user can get the services from the cloud. Public clouds are run by third parties. Applications from different customers are likely to be mixed together on the cloud's servers, storage systems, and networks. Public clouds

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are mostly hosted away from customer premises. Such as Amazon, Google Apps, Windows Azure, force.com

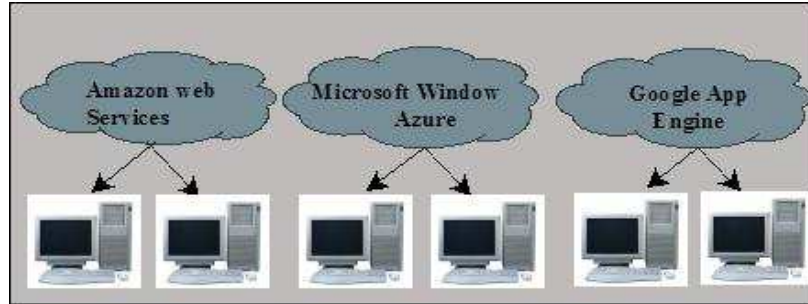


Figure 3: Public cloud

Private Cloud: It is used by the organizations internally and is for a single organization, anyone within the organization can access the data, services and web applications but users outside the organizations cannot access the cloud. Infrastructure of private cloud is completely managed and corporate data are fully maintained by the organization itself.

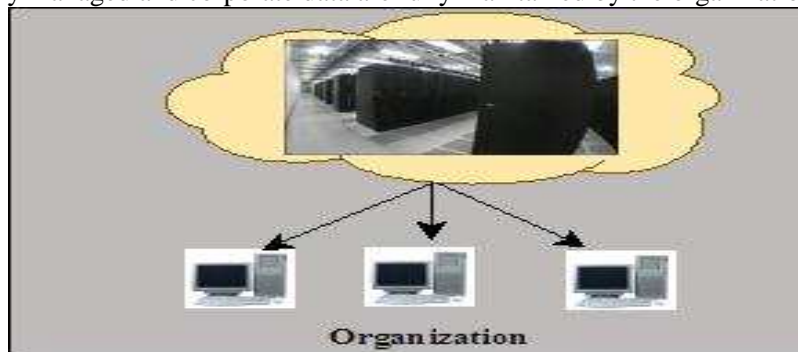


Figure 4: Private cloud

Hybrid Cloud: This Cloud is a combination of two or more clouds (public, private and community). Basically it is an environment in which multiple internal or external suppliers of cloud services are used. It is being used by most of the organizations such as IBM and Juniper Network.

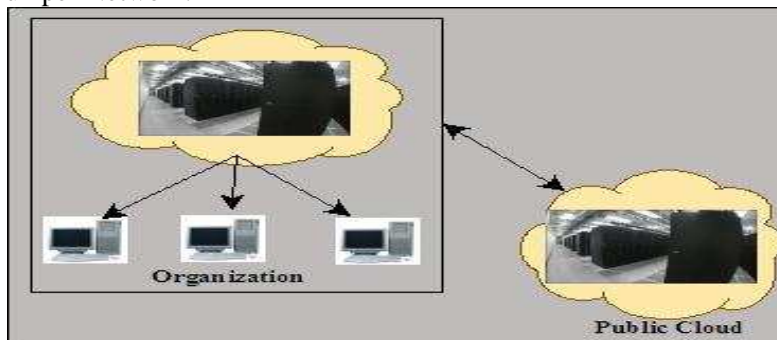


Figure 5: Hybrid cloud

Community Cloud: This cloud is basically the mixture of one or more public, private or hybrid clouds, which is shared by many organizations for a single cause (mostly security). Infrastructure is to be shared by several organizations within specific

community with common security, compliance objectives. It is managed by third party or managed internally. Its cost is lesser than public cloud but more than private cloud.

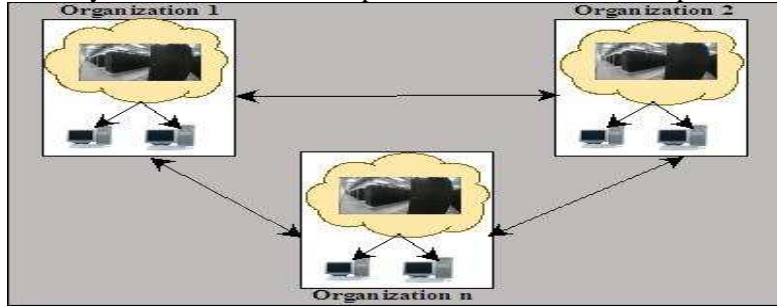


Figure 6: Community cloud

Cloud computing is highly scalable and creates virtualized resources that can be made available to users. So, Cloud computing will have a significant impact on the mobile environment in the future [10].

3.1.3. Characteristics of cloud computing

As Cloud Computing is booming in market, several major benefits have become evident. The following are some of the benefits for those who offer cloud computing-based services and applications.

Cost Savings: The Cloud promises to cut the cost of acquiring, delivering, and maintaining computing power. By using cloud computing based services and applications, companies can reduce their capital expenditures for increasing their computing capabilities.

Mobile Access: Cloud services are having a major impact on cellular phone technology. It enables to access high-powered computing and storage resources for anyone with a network access device. So with the help of Cloud, anyone can access the Cloud Services through mobile [11].

Scalability and Capacity: This means the service can be quickly scaled, often automatically. By using of Cloud, scale up and down the services based on their requirement. Traditional computing also doesn't support scalability.

Broad Network Access: Broad network access means that the hosted application can be accessed through any network based device. E.g. laptop, desktop, Smartphone, tablet device etc. Broad network access is accomplished by using the built-in web browser.

Shared Resource Pooling: By using the concept of resource pooling multiple organizations can share the underlying physical cloud infrastructure. This increases the purchasing power for these companies because they can access to a larger pool of resources rather than procuring the physical or virtual infrastructure themselves.

Multi-Tenancy: In a cloud environment, services owned by multiple providers are co-located in a single data center. System maintenance is also done by Cloud Service Provider.

3.2. Proposed cloud restaurant based services (CRBS) architecture

The CRBS Architecture is proposed in Cloud for accessing Restaurant information. When a user arrives at a new city, he/she may want to know the popular restaurant in this city. Then it is very hard for him to search. The Proposed Architecture is considered only

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searching restaurant based services. In this Architecture, Cloud Service Provider stores restaurant related information like address, contact number, food style information etc. The main components involved in this architecture are User, Cloud Service Provider and Cloud Location Service Provider. The cloud enabled mobile application is shown in Figure 7. Figure 8 explains the pseudo code for the function of the architecture.

User is an entity who wants to access LBS data. It is issued with a service certificate with certain access privileges. A user can access its current location information through a Cloud Service provider.

Cloud Service Provider (CSP) is responsible for providing services to cloud users and verifying the access control to the legitimate users. Cloud Service Provider allows the users and provides the accessing services to users by Authentication process. CSP will take charge depends upon the service by a metering pattern.

Cloud Location Service Provider (CLSP) is an entity that provides customized LBS according to the user's request with her/his location Restaurant information. Authentication is done by CSP, the user request will go to the CLSP. CLSP provides the services to user based on their requirement.

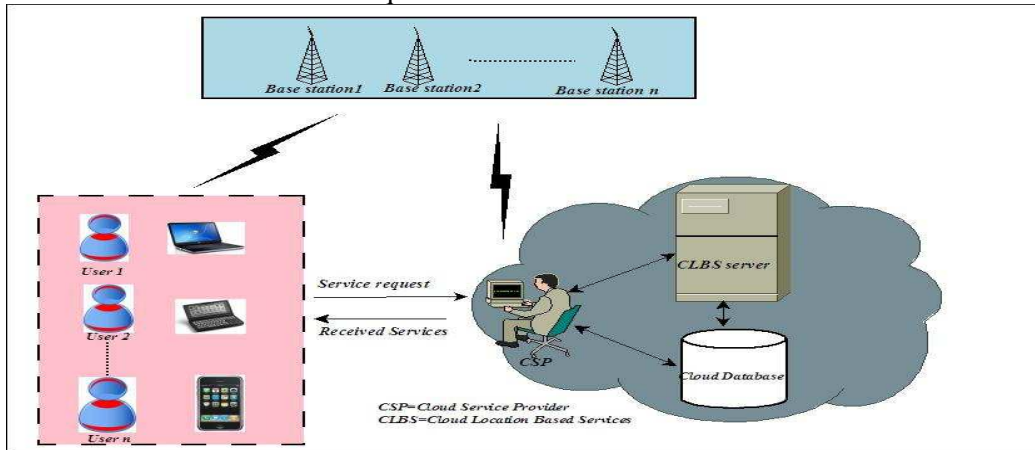


Figure 7: CRBS Architecture

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1. RegisterUser(Phone Number)
2. For every RegisteredUser do
3.   If the User is Authenticated do
4.     When user into the Location
5.       Identify Location( )
6.       For every user do
7.         CSP provide the Services
8.       End For
9.   End If
10. End For
Identify Location ( )
1. Identify the location the user is currently present using either cell id or GPS.
2. Identify the number of users present in the location for whom the services have to be provided.
3. return Location co-ordinates
  
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Figure 8: Pseudo code for the function of the architecture

4. Conclusion

Mobile Computing applications through internet e.g., PDAs, laptops, cell phones and etc. are growing rapidly. In this paper, Architecture is proposed for LBS in Cloud Environment. Nowadays, Cloud Computing is a rapidly growing innovative technology. The Combination of Cloud Computing and LBS brings lots of availabilities to the mobile world. The proposed Architecture helps to minimize the Complexity of the LSP and helps to improve the availability of services. CSP is responsible for providing services to the Mobile Users. CSP takes charges according to his/her usage by a metering pattern. So, Cost is very low while accessing the services.

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