

# A Framework for Mobile Web Mashup's using Cloud Resources

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**Abstract**—Mash up in the world of web can be described as a functionality that integrates two or more web services to create a new service. The service created is formed by different web services and hence can be termed as a hybrid web application. Cloud computing and mobile computing are the revolutionary fields and designing applications which make use of both cloud and mobile resources have high technological impact in the internet world. In this paper we brought forward a framework which is flexible to build mash up application which makes use of both cloud and mobile resources. The resultant service or application is deployed in any mobile ad hoc host which can be integrated into the mobile device and can be accessed through cloud network. The framework is flexible which incorporates different protocols both from the domains cloud network and mobile network. The designed framework is tested on different performance and compatibility metrics by assuming some rough sets of data. The proposed framework can be also be implemented in area of semantic web in the future research work.

**Keywords**—Mash up; cloud computing; mobile computing; hybrid application; framework

## I. INTRODUCTION

**Web mash up's** are services that are created by taking the functionality or services from two or more services in either single domain or two or more domains. Mash up services that are created from two or more domains are called as hybrid web **mash up's**. In this paper we discussed about the hybrid mash up services in mobile environments by taking the resources from the cloud networks. Mobile devices can access the cloud resources provided by the cloud. Service created in mobile device and another service taken from the cloud network or some functionality which describes about that service can be access on demand from the cloud network and a mash up service can be created [1]. To implement this some framework has to be developed which reduces the delay in access and increases efficiency to develop a mash up services and also should consider the power consumption, memory and network ubiquity.

Here the cloud network references more to the web cloud since all the necessary protocols accessed using the necessary tools and guidelines and help in building a secure framework for integration and deployment of mash up service.

In this framework the interface methodology and various step by step process of building a hybrid mash up service is discussed [2]. Initially a service by cloud network is taken or started and another service from mobile or an application is taken and various connection methodologies for e.g. like when an application is connecting to a cloud service a component manager in cloud service identifies the heterogeneous platform that should be able to transport the desired service to the concerned platform. Various transportation protocols like Hyper Text Transfer Protocol (HTTP), eXtensible Markup Language (XML) are used in the interface protocols.

## II. RELATED WORKS

This section deals with the literature survey we have done by considering the issues of the related work done. First we review the research work that is trending on mash up applications which use interrelated domain integrations.

Secondly we review how the research work can be continued by considering different aspects of cloud related architectures and mobile related architectures and by integrating them through which a scalable and performance oriented hybrid architecture is projected.

After the web 2.0 Mash up applications came into existence and how to build mash up services are described by using various functionalities. Many frameworks have been designed how to build a mash up application pertaining to a single domain or in multiple domains but developing such a hybrid application using two different domains is very rare.

There are many client-server architectures that design the mash up services but the drawback in those architectures is the lack of trust on the server side by the client. Hence designing a framework that gives more reliability and scalability came forth into light.

## III. PROPOSED WORK

The prototype in developing mobile web mash up services **involves different API's and data sources depending on the user approach.**

In this paper we proposed a framework which uses both the cloud and mobile environments and implements a flexible way **of designing web services and also web mash up's** a web application hybrid services. We proposed this framework by considering the existing frameworks and by enhancing the

protocol suites and other middleware components. We also proposed new interface mechanisms like mash up engine and mash up interface that is used to deploy the service or application from cloud network to mobile host.

The protocols that are used in cloud computing and mobile computing are enhanced for easy interface and deployment of the necessary mash up services [3].

The mash up engine, step by step procedure of architecture and a sample request response method from two different domains is shown in the following research work. Performance, compatibility issues and future research work are discussed.

#### A. Mash up Integration

The concept of Mash up came from the web 2.0 which makes use of heterogeneous combination to develop a new type of web service.

#### B. Cloud Network Framework

Cloud computing architecture includes different services like software as a service, platform as a service. The necessary protocols that are to be implemented to interface with mobile environments are designed and are linked with the network layer for the reliable transportation of service [4].

Little change in the architecture is required when it comes to the bandwidth and storage of the cloud. Redirecting the requests need REST protocol and XML-RPC (remote procedure calls) can be replaced by SOAP protocol when it comes to familiar environment which typically require user custom programming [5].

The prototype architecture is shown as per the web cloud network. The general behavior of an adapter is shown as below.

Cloud protocols are invoked whenever a particular service created is deployed to a device and thereby web protocols like HTTP, FTP have their medium of transportation.

The framework designed is highly abstracted from different domains and enables a secure communication [6].

#### C. Mobile service architecture and Flow description

Mobile service uses the internet or cloud to create service or the service can be requested from mobile host which acts as a client and response is generated and the service is generated.

The flow description about how a service is accessed from mobile host is illustrated as follows.

- Send request to Cloud manager which redirects to web cloud.
- The request is noted by Inter mobility engine and the task is initiated.
- Adapter engine handles the hybrid cloud service invocation.
- Interoperability engine is used for the inter operations between the mobile host and the cloud.
- API engine is used to enable the necessary application interface mechanisms [7].

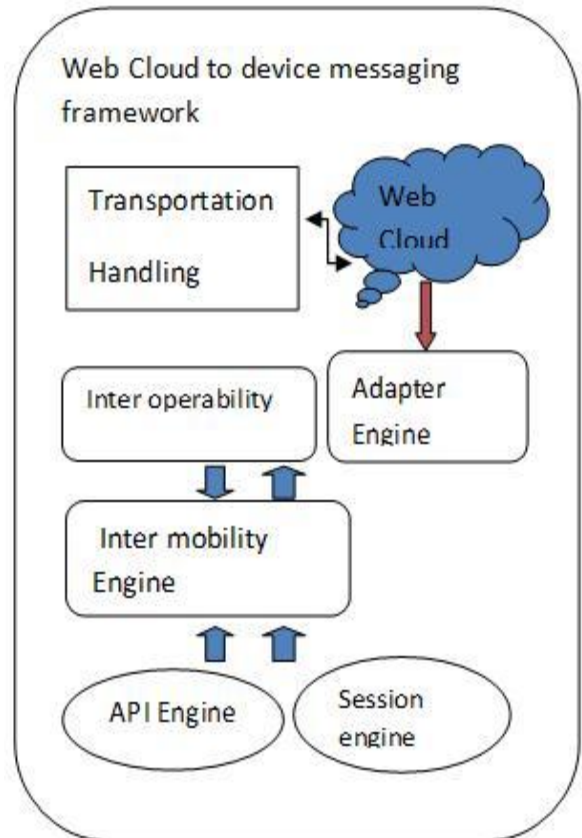


Figure: 1 – Cloud Network Framework

- Session engine controls the session management and the time taken by the service to be invoked.
- Finally adapter engine collect the results, store the temporary data and send the response to the mobile.

The mash up engine which is responsible for interface mechanism of mash up application and service is shown as below.

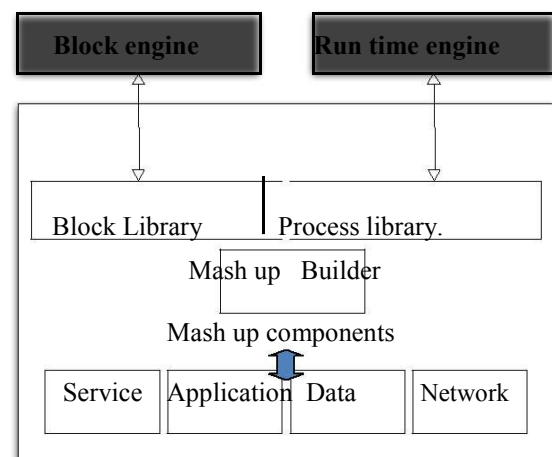


Figure: 2 - Mash up Engine

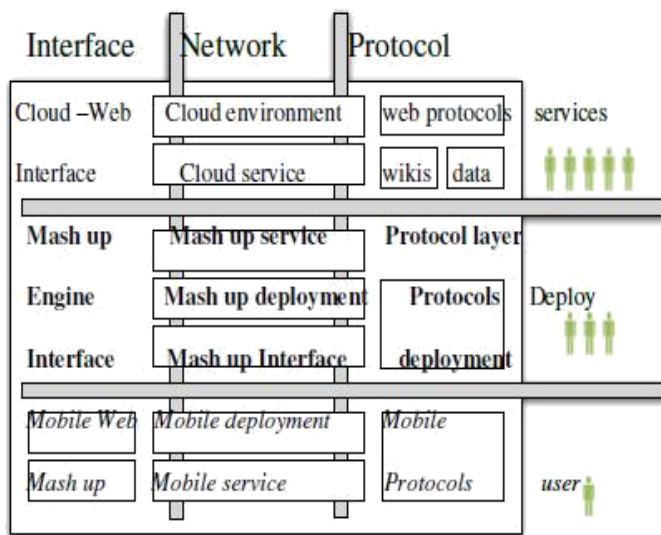


Figure: 3 - Mash up application framework

### Mash up Application framework

**Interface:** This part of the framework deals with the necessary interface mechanisms [9]. Mash up engine act as middleware component.

**Network:** In our framework Network Layer is crucial and it enables which network to be enabled as client and server. The cloud network acts as server when a request is generated from mobile and mobile acts as server when response is generated from the middleware.

**Protocol suite:** The different protocol underlying this architecture can be broadly divided into three categories

- Cloud protocols
- Mobile protocols
- Mash up Middleware protocols

Cloud web protocols are used to guide the network transmission between the cloud and mobile host and between **the middleware's**

Mobile protocols are generally the low set protocols help in mobile host network and service generation (e.g. MLP Mobile Location Protocol, WAP wireless application protocol).

Mash up middleware protocols use the common web oriented protocols like JSON-RPC, SOAP, REST and mash up datagram (MDP) protocols to deploy the necessary web service [10].

The Network layer is responsible for the optimal path routing of the data to the other layers.

The framework designed implements all the necessary protocols and the service part follows Java 2 Enterprise Edition (J2EE) architecture. New Mash up application can be designed

bases on this architecture and can be enhanced by implementing Graphical User Interface (GUI) [8].

A sample request call from one domain to other domain is illustrated as follows.

Assume that mobile request is  $m$  and cloud response is  $c$  and the mash up middleware component is  $mm$  and variable serve **for services offered by cloud, mobile and middleware's.**

```
var request m, serve
```

```
Check if c can provide service for the request m
```

```
If (!c==serve)
```

```
No response from cloud for request m
```

```
Start new request say m1
```

```
If (c==serve)
```

```
Response generated from cloud through adapter engine.
```

```
If (c==service && m1==service)
```

```
Deploy the service into hybrid mash up application say mm
```

```
If (mm==serve)
```

```
Mash up application generation through mash up engine.
```

The service thus generated can be termed as a hybrid mash up service deployed in mobile host which obtained its resources from a cloud.

The MCM which is Mobile Cloud Mash up engine manages the session invocations and the time taken by the request transmission and response transmission.

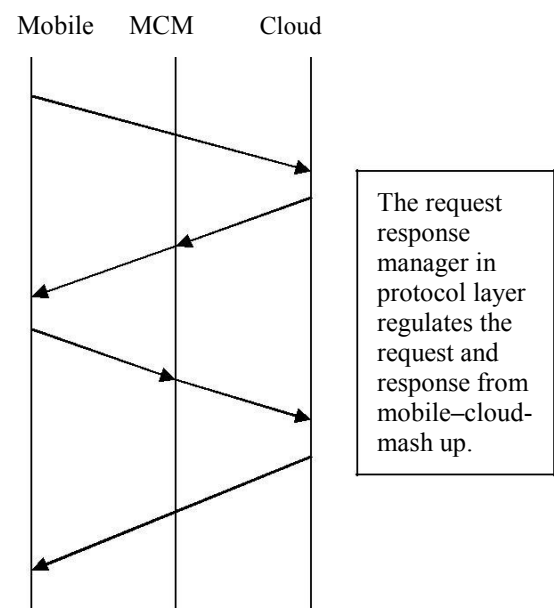


Figure: 4- Request and Response

#### IV. PERFORMANCE ISSUES AND COMPATIBILITY

To evaluate the performance metrics we have made a survey and compared our designed framework with other popular frameworks. The following parameters are considered while taking the survey.

- Network ubiquity which represents the total performance of networking interfaces between the environments
- Protocol definition represents the set of protocols used and also enhances the traditional protocols used like use of SOAP protocol replacing XML-RPC.
- Interface mechanisms which guide through different network interfaces and collaborations from those specified networks.
- Timeout mechanisms represent different sessions and total execution time by various processors [11].

Finally the performance is evaluated as the results are tabulates as follows.

Performance	Scalability	compatibility	Reliability
High when cloud network is faster	High on all aspects	High when mobile nodes are traffic less	High when both the domains are traffic less
Medium when mobile network is low	High	Medium	High
High when Interface is good	High	High	High

Table: 1 - Performance Metrics

The mash up interface mechanism should be compatible with both the cloud and mobile network to access the functionality or any web service.

The mobile network depends on the mobile service providers and cloud network depends upon the internet service providers and hence the performances issues can be dynamically vary according to the time period.

The interface or middleware component at times can also be implemented as client-server architecture and can be responsible for the reliable web service.

The prototype of the proposed architecture is depicted as below.

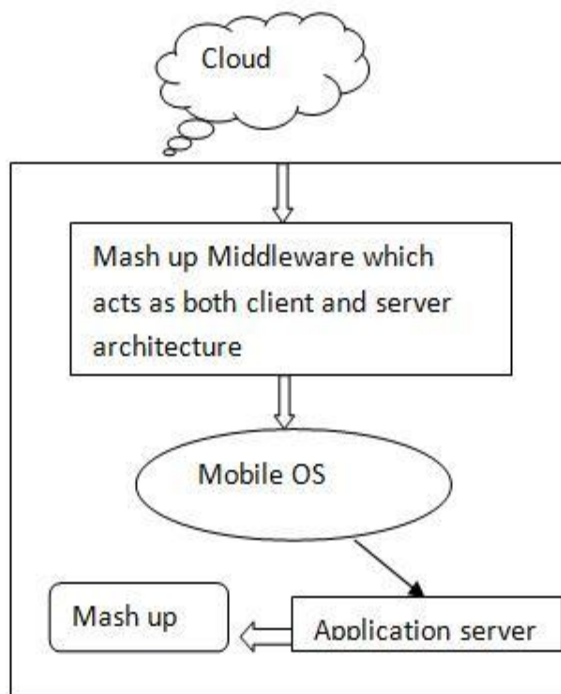


Figure: 5 – Proposed Architecture

The adapter engine is used to execute the necessary transaction and collect the required results and send the required results to mobile devices.

The performance of adapter engine is evaluated based on the mash up interface engine that access the domain network. The transaction is based on the network transmissions of data but the compatibility of the adapter can be manually evaluated by taking some sample sets of data.

We also evaluated the performance and compatibility of the adapter engine by some rough sets of data and the transactions can be enhanced further by implementing on the network mediums of high scalability.

#### V. CONCLUSION AND FUTURE WORK

Mobile Cloud technology is the latest popular growing technology and introducing a new hybrid framework in this field is challenging. In this paper we contributed our research work in mobile and cloud domains and by integrating them to produce a mash up application service which can be deployed through the framework proposed. We presented a secure and effective communication framework for mash up applications. The network interface and protocols specified ensures the different security related issues like authentication, integrity, confidentiality in cross domain inter communications. Our future work will continue in evaluating the framework designed and to implement different performance and compatibility related strategies [12]. Research work can be continued by implementing our framework in ongoing research area of semantic web.

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