Cloud Architecture with Coordinate Mapped Pixels

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Abstract

This paper represents a new Cloud Architecture with Coordinate mapped Pixels. Instead of scripting all the commands and interfaces we simply let all the work to be done by the cloud server and transfer two things only; Coordinates of the screen where the pointer on the client side is clicked & Image (snapshot) from the server of the changed screen corresponding to every click and also after a periodic interval. The method proves to be efficient in providing better ways to use high end cloud based services by reducing the complexity and work load on client side. Further researches will help it in acquiring realistic grounds.

Keywords: Cloud Architecture, Pixel mapping, Coordinate Mapping Approach, Platform independence.

1. Introduction

Till date all the communication through browser is done by commands i.e. every single button we click on the web page will send a corresponding command to the server [1], to load the next page of the website or for the next event to occur. But in case of Cloud based services [2], this type of network architecture will not serve the purpose. Suppose we are working on Adobe Photoshop [3] or Autodesk Maya [4], we have numerous of commands and buttons and we cannot script all those commands in our browser so how can we make the system work. One of the possible solution may be: instead of scripting all the commands and interfaces, (Since all the applications will have different interface and different set of commands) , we simply let all the work to be done by the cloud server and only transfer two things: Coordinates of the screen where the pointer on the client side is clicked and Image (snapshot) from the server of the changed screen corresponding to every click and also to any periodic change[5]. As a result, the data overhead of transmission is decreased. Scripting problem of commands and interface is solved as we are only transmitting "Images" & "Coordinates". Hardware problem is solved, as all the processing is done on the server side; minimal hardware is needed on the client side.

2. Cloud Computing

Cloud computing [6] refers to the applications , the hardware and system software delivered as services over the internet. The infrastructure in the service centre is the cloud we call .

2.1. Cloud Computing Architecture

It consists of the following components.

1. User Interaction Interface:- it is the space where interaction between humans and machines occurs [7]. Its goal is to facilitate effective operation and control of the machine, and feedback from the machine which aids the operator in making operational decisions.

2. Systems Management:- it refers to enterprise wide administration of distributed systems including computer systems [8].

3. Provisioning Tools:- Provisioning is the process of preparing and equipping a network to allow it to provide (new) services to its users [9].

4. Services Catalog:- it is a list of services that an organization provides, often to its employees or customers [10].

5. Monitoring and Metering:- They go hand in hand.Monitoring- The term network monitoring [11] describes the use of a system that constantly monitors a computer network for slow or failing components and that notifies the network administrator (via email, SMS or other alarms) in case of outages. Software metering [12] refers to Tracking and maintaining software licenses. Software metering provides another benefit to companies by enabling them to set and maintain a consistent set of standards across all levels of a company.One of the main functions of most software metering programs is to keep track of the software usage statistics in an organization. This assists the IT departments in keeping track of licensed software, which is often from multiple software vendors .

6. A server [13] is a physical computer (a computer hardware system) dedicated to run one or more services (as a host) to serve the needs of the users of other computers on the network. Depending on the computing service that it offers it could be a database server, file server, mail server, print server, web server, gaming server, or some other kind of server.

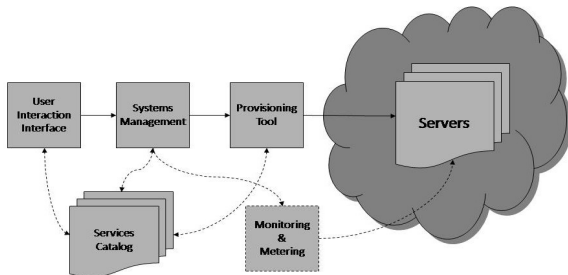A diagrammatic view of the architecture is given below.

Figure 1. Cloud Computing Architecture

3. Coordinate Mapped Pixels

3.1. Method

The method is simple if we overview but it have its own complexities which are discussed later. This method is developed after compounding the concept of remote desktop, SAAS (software as a service) [14], Flash video running architecture & cross platform application development.

Here, method seems simple but there are some unsolved complexities, like data input from user side using keyboard, providing the live experience of working environment.

The method is similar to what is used in RDP [15], but the purpose and area of working is different. RDP is used for remote desktop services and our extension is to provide cloud based web services, SAAS [16] in an efficient manner.

3.2. Working

A snapshot of the server virtual screen is sent to the client (user end). User will see the image and click on the screen above the corresponding button (command). Coordinates corresponding to the click on user end is sent to the server will check the coordinates and map the coordinates to its own virtual screen, and run a command with the button lying behind that coordinate on the application running on the server.The next screenshot is taken after running the command and sent to the user. The user will see the effect of its given command in the next screenshot, and will again click on the screen to give the next command (Which will again send the coordinates from user end and then the corresponding command is run on the server end and server will send back the next updated screenshot and the process continues).

This explains the new type of system which will work efficiently and make the concept of perfect personal computing feasible but we have to make some arrangements for the data entry (from keyboard) from the user side. However, there is not much problem when working with touch screen devices [17].

3.3. Algorithm

The main algorithm function code for working model of coordinate mapped pixel is as follows:

3.3.1. Initializing the coordinates.

Step1: Coordinates are always relative to the top left of the image.

Step2(a): Find the coordinates of the mouse when it is clicked.

Step2(b): Take into account any scrolling and the position of the image inside the document.

Step3: Find the position of the image tag within the page.

Different browsers define the position of an element in slightly different ways.

3.3.2. Applying Coordinate Mapped Pixel.

Step1: Initialise the coordinates.

Step2: The image needs an ID which is used in the code.

Step3: Use Javascript to defines the function that will run when the mouse down event fires.

Step4: The span blocks are used to display the coordinates.

Extended functionalities like data entry from user can be provided to the page using JavaScript with the same.
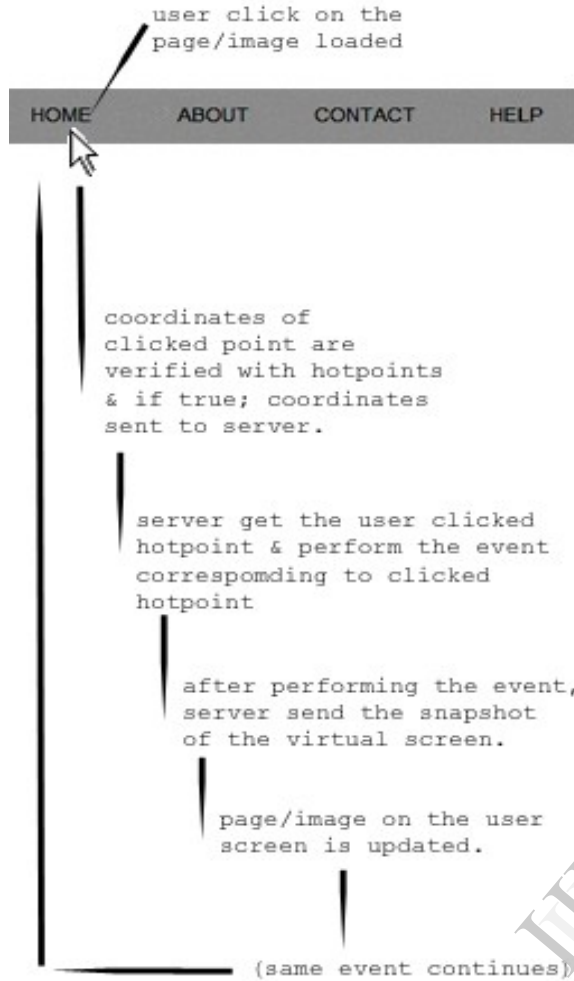
Figure 2. Workflow

The figure below shows the existence of "Hot Spots" and "Hot Points". Hot Spot refers to the region where the action of a click results in triggering the event for another page/service request from the client to the server. Hot Points are those coordinates which lie inside the Hot Spot.

Figure 3. Figure showing hotspots and hotpoints.

4. Results

The feasibility of system is tested with the development of a Cloud based service using pixel

mapping. The concept proved itself feasible and actual data rate is decreased.

The prototype test results of implementations indicate the following data download change.

Table 1. Prototype test results

Data Compression(Size)	
Traditional Scripting Method	Coordinate mapped pixel method
596kb	462kb

This is approximately 22% decrease in data rate per click and which could be extended much more if we use any of the image compression algorithms.

The upload data is also decreased as we are sending the coordinates only. In the coordinate mapped pixel method as we do not have any metric/ method to measure and come up with a rational explanation so the difference can be experienced in the prototype implementation.

5. Conclusion and Future Scope

This architecture is developed as a new technique to provide cloud based services, efficiently. But in some aspects [8] it provide better way to use cloud based services, or we can say that it is one of the best way to provide high end [9] cloud based services. But to bring this concept to reality, problems related to the concept first be solved.

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