CS5052 – Paper Review

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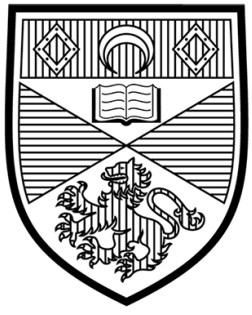

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" Clone Cloud: Elastic Execution between Mobile Device and Cloud "

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INTRODUCTION:

CloneCloud presents itself as a research project that investigates the effectiveness of elastic execution between mobile desktops and cloud servers considering the rising usage of mobile applications, the richer functionality on mobile devices, and the advancements in connectivity with powerful machines ranging from laptops and computers to commercial clouds.

The system functions as an *adaptable application partitioner* and runs a runtime that enables unmodified mobile programmes running in an application-level virtual machine to smoothly transfer some of their execution from mobile devices into device clones running in a computing cloud.

The goal is to seamlessly offload compute-intensive tasks from mobile devices to cloud servers without disrupting the user experience or requiring significant changes to existing mobile applications.

Finally, evaluation tests were conducted by the authors to prove how CloneCloud can adapt application partitioning to various contexts.

OBJECTIVE:

The authors highlight the increasing demand for mobile applications that require significant computing resources such as image processing, data analytics, and gaming performance. However mobile devices have limited resources and executing such talks on mobile devices can result in *deficient performance and reduced battery life.*

The authors suggest that the solution is to offload these operations to the cloud, where sizable processing capabilities are accessible, using the potential of mobile cloud computing and IoT. Including the *CloneCloud vision*, **mobile device applications can be enhanced with ambient computing to make them faster and more energy efficient.**

The idea behind CloneCloud is that it can be *practical to pay the expense* of transporting the essential data and code from the device to the cloud and back if execution on the cloud is much faster than execution on the mobile device.

A mobile client and a server form the two parts of the CloneCloud system. When necessary, the cloud server makes available added computer resources to offload operations from the mobile device while the mobile client executes the application logic on the mobile device.

Based on resource availability and network conditions, the system dynamically divides application execution between the mobile client and the cloud server.

The operations that can be transferred to the cloud server are detected using static and dynamic programme analysis approaches, per the authors. While the dynamic analysis tracks how the programme is being used to discover jobs that can be offloaded, the static analysis finds tasks that are computationally intensive and have little to no user involvement.

Once a task is found for offloading, CloneCloud transfers the execution context from the mobile client to the cloud server by making a light clone of it. The task is then carried out by the cloud server, and the mobile client obtains the results.

Additionally, a variety of optimizations are used by CloneCloud to reduce the overhead associated with offloading jobs to the cloud server. To lower the *latency of offloading,* it employs a method known as speculative execution to execute tasks on the cloud server before they are needed. To decrease the volume of data that needs to be sent between the mobile client and the cloud server, it also uses a method known as **result prediction.**

NOVELTY:

The proposed technique is considered novel since it eases a seamless shift of computationally demanding tasks from mobile devices to cloud servers without affecting existing mobile applications. Based on resource availability, network protocols, and process optimizations for offloading, the system dynamically divides application execution between the mobile client and the cloud server.

CONTRIBUTIONS:

A benefit of CloneCloud is its ability to adapt to changing resource availability and network conditions. By dynamically partitioning applications execution between the mobile client and the cloud server, CloneCloud can ensure that tasks are executed in the most efficient manner possible, based on the resources that are available at any given time.

This adaptability is particularly important for mobile applications, which often run in environments with limited resources and unpredictable network conditions.

For CloneCloud to be useful for deployments in the real world, the paper discusses several issues that must be resolved. These issues include the overhead of offloading tasks, the energy consumption of mobile devices, and the security and privacy implications of offloading sensitive data to the cloud.

EVALUATION:

To evaluate the performance of CloneCloud, the authors experimented with a set of benchmark applications, as well as a real-world application (a mobile web browser). The results showed that CloneCloud can supply significant performance improvements over traditional mobile execution, especially for computationally intensive tasks.

The evaluation result shows that CloneCloud can adapt application partitioning to different environments and can help some applications achieve as much as a 20x execution speed-up and a 20-fold decrease in energy spent on the mobile device.

However, the researchers also noted that several challenges need to be addressed to make CloneCloud practical for real-world deployment. These challenges include the overhead of offloading tasks, the energy consumption of mobile devices, and the security and privacy implications of offloading sensitive data to the cloud.

The energy utilisation of mobile devices is another issue. The need to send data across a network makes offloading operations to the cloud potentially more energy-efficient than carrying out such functions on a mobile device.

CONCLUSION:

Overall, the paper supplies a comprehensive analysis of the challenges and potential solutions for elastic executions between mobile devices and cloud servers. The proposed solution, CloneCloud, offers a novel approach to offloading compute-intensive tasks from mobile devices to cloud servers.

To make CloneCloud useful for deployments in the real world, however, several issues still need to be resolved, such as its limitations about its inability to move native states and to remotely export unique native resources. To solve these issues and assess Clone Cloud's viability in practical settings, further research is needed.

Total Words: 977 Words