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**Topic: Cloud Computing**

**Article: Toward Vehicle-Assisted Cloud Computing for Smartphones**

<https://ieeexplore-ieee-org.proxy.seattleu.edu/document/7272124>

**Citation: H. Zhang, Q. Zhang and X. Du, "Toward Vehicle-Assisted Cloud Computing for Smartphones," in IEEE Transactions on Vehicular Technology, vol. 64, no. 12, pp. 5610-5618, Dec. 2015.**

**Summary of Article:**

Mobile phones are a huge part of our everyday lives. We are carrying a powerful computer that fit in the palm of our hands. Smartphones are getting more powerful each day with its capabilities, but it does have memory and processing limitations due to its size. That is why the authors proposed mobile cloud computing to address those issues. By using nearby mobile to form an ad hoc virtual cloud, cloud service providers infrastructure-based cloud, or vehicles as mobile devices formed cloud, a smartphone can offload heavy computing applications onto these clouds to do the computing. The authors also introduced flexible offloading strategy where the mobile device will select the most efficient method to offload the work to after looking at several parameters (network stability, computing needed, memory needed, response time, etc), the mobile then will select one of those cloud services. After experimenting, the authors concluded that mobile cloud computing is achievable as well as energy efficient on the mobile device.

**Article Purpose:**

The article’s purpose was to propose a method to offload mobile device’s computing and storage work to the cloud. This way, the mobile device will be able to perform storage or CPU extensive applications. The authors argued that with their algorithm, the mobile device will pick the best method between cloudlets, vehicle cloud, or central cloud. Since each method have their pros and cons, the mobile device will have to be aware of that when selecting a method for a task. Central cloud is unsuitable for data-intensive task, cloudlet might not have sufficient resources, and vehicle cloud might have connectivity issues. Other than the cloud technology used, the authors also proposed two different offloading method to show that mobile devices can successful offload the task to the cloud. There are system-level offloading and method-level offloading. Offloading also takes into effect the energy level required to offload a task onto the cloud. The calculation included flexible offloading strategy (FOS) and how it can be energy efficient during the offloading process.

**Methodology**

The authors presented vehicle-assisted cloud-computing (VACC) architecture, the central cloud, a cloudlet, and a vehicular cloud. The problem that they wanted to answer was which cloud node the requested task should be migrated to and how to find a reliable worker node to execute the task when the vehicular cloud has been selected as the cloud service provider. In the experiment, the authors chose parameters broken down into four cases and performed numerical calculations on the theoretical performance. Different cases had different results due to the tasks and resources needed to perform that task. In the end, it was found that by combing the different cloud technologies, mobile devices can choose the correct resource and the offloading process can be energy saving.

**Conclusion**

The article proposed combing different cloud technology (vehicular cloud, fixed central cloud, and cloudlet) to expand the current available resources for task requests from smartphones. Multiple scenarios were tested to make sure the mobile device would choose the right resource for the task base on computing power, network strength, memory availability, etc. Results showed that the FOS does utilize the right resources to perform the task. Such as employing the vehicular cloud to accomplish application offloading for smartphones when the central cloud does not satisfy the offloading requirements.

**Article Strengths:**

The article was very detailed about the terms and technology used. It was clear what each cloud platform was and what supports it. They backed their research with calculations and explored different scenarios when a mobile device would need to use cloud computing. The authors were also explicit about what was included in their experiment and what was not. For example, in one of the cases, the authors mentioned that they do not consider the mobility of vehicles when the reliable worker node performs the requested task. They removed any assumptions the readers might have made for that experiment. Overall, it was a really good research paper.

**Article Weaknesses:**

A lot of the results were theoretical, I wish they would actually use a smartphone and test the switching between a cloudlet, vehicle cloud or central cloud to see how much computing or memory that process would save. I know that implementing all the cloud technologies might be complicated that’s why it wasn’t done but it would be really interesting to see. I think this proposed idea can change the way mobile device operates.

**Recommendation:**

There was no recommendation in this article.

**Checklist:**

Number of Authors: 3

Number of Citations of Article: 53

Number of Citations to other articles: 16

Methodology Explained (Yes/No): Yes

Technology Explained (Yes/No): Yes

Experiments and Data Reviewed (Yes/No): Yes

Conclusion Exist (Yes/No): Yes

Recommendations Exist (Yes/No): No