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CLUSTER BASED ON MOBILE DEVICES

The popularity of smartphones among users is constantly growing [4], whereas their computation capabilities are hardly used. Mobile devices demonstrate an obvious trend towards the miniaturization and energy savings, at the same time becoming more and more powerful.

Nowadays an average smartphone has the computational power equal to supercomputers of the 70s, but it rarely reaches its full computation capacity in operation. According to Felix Busching from Technical University of Braunschweig, Germany, it is possible to cluster a great number of smartphones by means of Wi-Fi to achieve the computational power comparable to that of state-of-the-art supercomputers [5].

Busching's concept implementation implies clustering a large number of smartphones collected in the same place. However, their transformation of into a supercomputer faces a major obstacle that is their fast running out of battery charge during intensive computing operations. Consequently, as Busching suggests, all smartphones should be powered through their chargers while operating as a unified interconnected "virtual supercomputer" [1].

Currently, plenty of successful scientific projects such as Seti@home, Einstein@home and World Community Grid or .net, exist [3]. These projects succeeded in proving the idea that creating voluntary-based clusters aimed to carry out certain complicated computational tasks is a viable alternative to buying or renting large computer systems.

A possible way to implement this idea into practice is to build up such systems in interurban trains. There is no doubt that most passengers have smartphones with them as well as an opportunity to hook their mobile devices up to an internal power system of a carriage [1]. By this means the problem of rapid discharging of mobile devices would be solved and all smartphones available while entering the united network over Wi-Fi connection can easily form a powerful cluster operating on the same principles as MPI. Because of communication limits a cloud computational system embracing the whole train should be built up on the basis of loosely coupled distributed system architecture like BOINC, that is to send tasks to devices and then combine the results [2].

Another interesting example of implementing this idea is the use of cluster power in corporate purposes. For instance, you need to compile a large project. Due to the system suggested you will certainly use less time to complete this task as a mobile phone may take 5 seconds to compile the file required while a cluster does this work for 0.5 seconds! So, you get a great chance to save your time by distributing the task inside this cluster system in comparison with a mobile unit that will carry out the same work much longer. Another important advantage should be taken into account: your company can save electric power additionally because your employees would use their own mobile devices for faster completing the task.

Undoubtedly, clusters based on mobile devices have other important advantages. One of them is an opportunity to cluster smartphones not only by means of special applications but even through social nets such as Facebook and Twitter. In addition, the more friends you have there, the more powerful cluster you can build up. Besides, mobile operators may get interested in this project. In this case they should promote purchases of smartphones linked to "virtual supercomputers" by default.

Thus, clustering smartphones have a lot of advantages. Firstly, such projects are considered to be relatively inexpensive or low-cost in comparison with common cloud calculations. Secondly, as modern mobile computational platform is becoming powerful and popular enough, there is no doubt it should be considered as one of significant computing recourses for carrying out resource-intensive tasks. Finally, mobile devices are provided with Wi-Fi which allows to exchange any information at a rather fast speed as well as at a low level of delay.

So, our nearest plans include designing and implementing a mobile application for Android operation system. This application is supposed to process incoming tasks, process them and send back results. Besides, another interesting idea is planned for our consideration. It is designing and introducing a mobile application which will be the main node in tasks distribution throughout the whole cluster system. After completing all the above mentioned projects, we will carry out our final task – to pool as many as possible smartphones into a large cluster within the faculty by means of our University Wi-Fi. Smartphones charging will be provided by USB-connection with faculty PCs and workstations. The main goal of this final project is to study the practical computational efficiency of a cluster based on mobile devices.

References

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