POWER EFFICIENCY AT DISTRIBUTED COMPUTING UTILIZING MOBILE DEVICES

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Modern counting tasks require more and more computing capabilities. This is usually being solved by adding new cloud datacenters with new, more advanced hardware. Apart from that the problem can be solved by utilizing existing hardware that is already in use but not involved in computing. Involving mobile devices is a double win: the average mobile device does more computing operation per same amount of energy [1] and there are billions of mobile devices already in use.

Computing on private mobile devices is way different compared to distributed computing in data centers: there are several key differences. First, every private mobile device has an unreliable network: bad cellular coverage and device owner's needs can interrupt computing. Second, the bandwidth of mobile and wireless internet is way lower than the bandwidth of internal networks of data centers. As a result, computing using mobile devices is more sensitive to a network traffic volume than computing in data centers. Third, private mobile devices are physically not insulated from intrusions, this means, the threat of stealing data and injection of junk data is higher than for regular data centers, and additional measures should be taken to protect the data. Last, but not least, mobile hardware has way different behavior compared to stationary hardware. Mobile hardware supposes short peak loads with long idle state, otherwise they throttle down the performance to avoid overheating. Stationary computing hardware usually have decent cooling systems that allow them to work at high load for a significant period of time.

The goal of this work is to build a principal model of power consumption measurement of distributed computing in the cloud of mobile devices[2]. The goal is to make a scheduling algorithm based on a map-reduce approach - a heuristic runtime scheduling algorithm that takes into account not only power consumption of computing devices, but also network transmission power consumption and expenses on additional security overhead. The algorithm is supposed to be an extension of existing heuristic algorithm [3], but in addition to computing time estimation it will also estimate power consumption.

References

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