Fides: A Hidden Market Approach for Trusted Mobile Ambient Computing

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Proposal

We propose Fides, a computation offloading mechanism for mobile devices based on trust between them. Fides provides: (i)Application Splitting, (ii) Metric Proposal, (iii) Neighbor Selection, (iv) Reputation Update.

Mobile Apps on Fides

Developers who use Fides mechanism should use the provided annotation (*@splitable* and *@split*) to define all the possible points in the application execution where the application can be split.
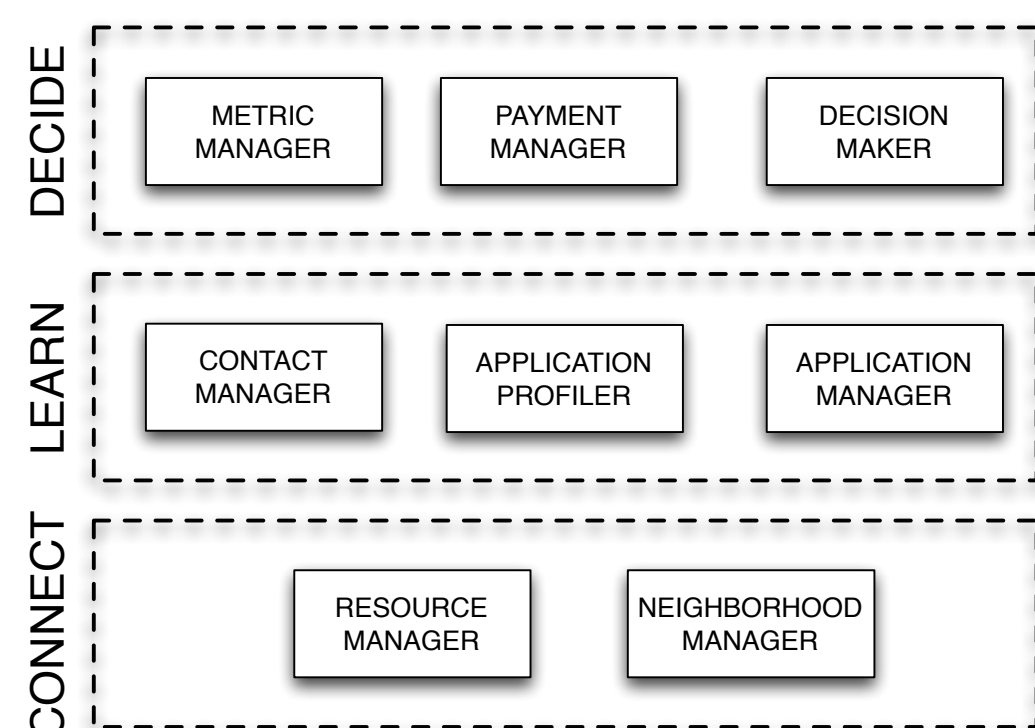

Figure 1: The three-layer architecture of Fides.

Credits and Reputation

Nearby users bid to the interested for offloading user and given their bids and their reputation she selects the most suitable.

A collective intelligence scheme (i)estimates, (ii)updates and (iii)broadcasts the trust scores.
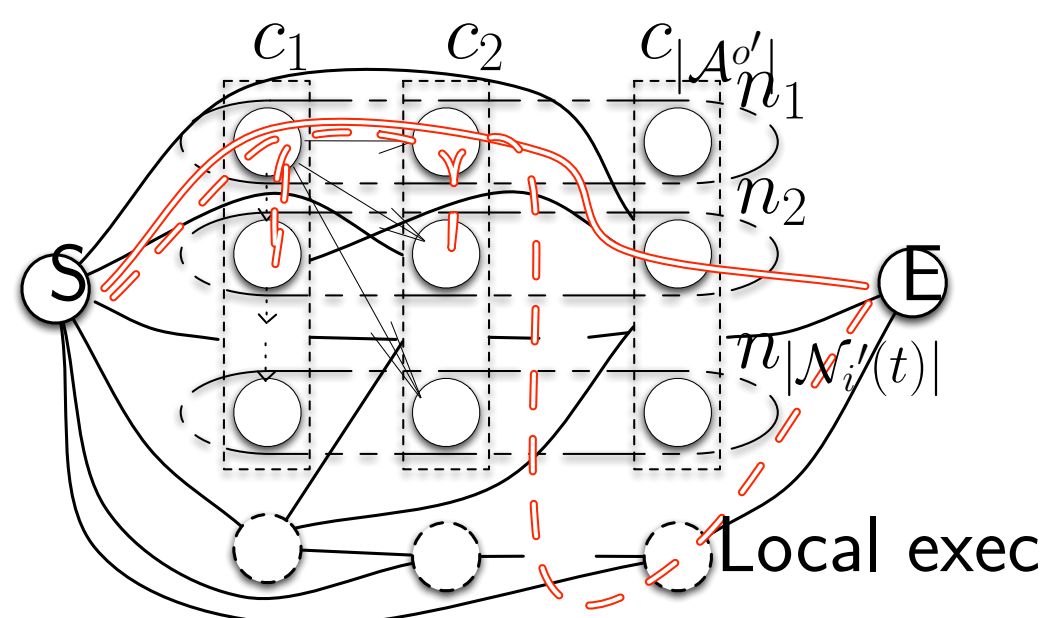

Figure 2: State Diagram of the proposed online algorithm.

Online Algorithm

A preprocessing part sorts the neighbors list, which detected by the **CONNECT** layer, and the classes list and can be executed proactively by the **LEARN** layer of Fides. The online argorithm, in linear time, goes through the sorted lists and selects the proper split.

Mobile Apps

Experiments on Google Galaxy Nexus, Samsung Galaxy SII, and Motorola Moto G using Android API and WiFi direct
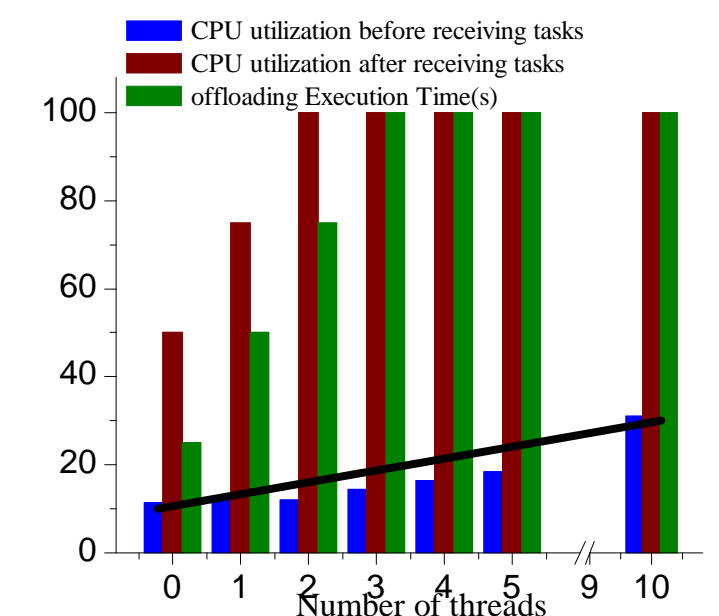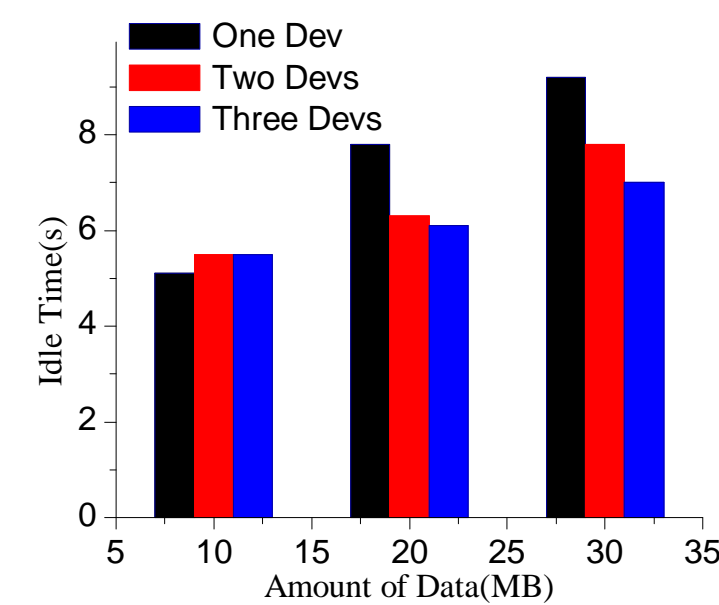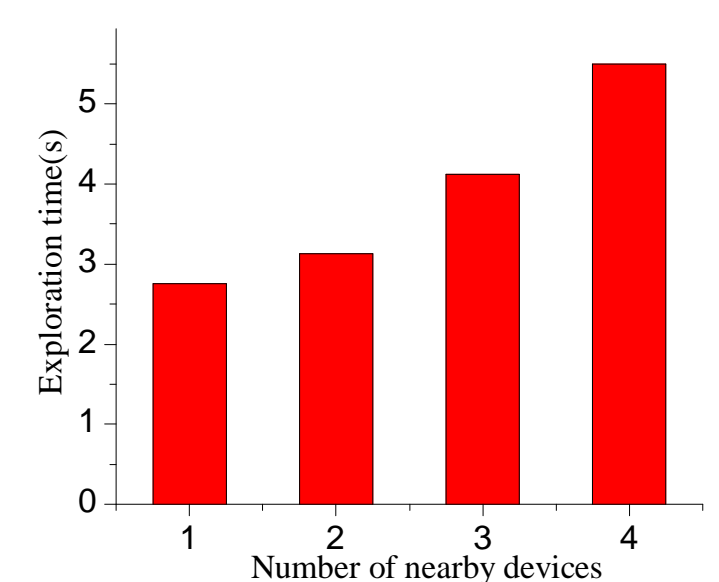

Figure 3: The time needed to explore the neighborhood and the idle time while waiting for the results are increasing with the number of nearby devices and the result size. Helper's delay response depends on her current utilization and in the number of running threads.

References

[1] S. Seuken, D. C. Parkes, E. Horvitz, K. Jain, M. Czerwinski, and D. Tan, "Market user interface design," in *Proceedings of the 13th ACM Conference on Electronic Commerce*, ser. EC '12. ACM, 2012.

[2] E. Cuervo, A. Balasubramanian, D.-k. Cho, A. Wolman, S. Saroiu, R. Chandra, and P. Bahl, "Maui: Making smartphones last longer with code offload," in *Proceedings of the 8th International Conference on Mobile Systems, Applications, and Services*, ser. MobiSys '10. ACM, 2010.

[3] S. Kosta, A. Aucinas, P. Hui, R. Mortier, and X. Zhang, "Thinkair: Dynamic resource allocation and parallel execution in the cloud for mobile code offloading," in *INFOCOM, 2012 Proceedings IEEE*, 2012.

[4] B.-G. Chun, S. Ihm, P. Maniatis, M. Naik, and A. Patti, "Clonecloud: Elastic execution between mobile device and cloud," in *Proceedings of the Sixth Conference on Computer Systems*, ser. EuroSys '11. ACM.