The Human-Provided Application Store

Muhammad Z. Candra

Distributed Systems Group, Vienna University of Technology, Vienna, Austria
m.candra@infosys.tuwien.ac.at

1 Introduction

In the last few years, we have seen the emergence of crowdsourcing platforms which have been used to solve problems in various domains. These crowdsourcing platforms usually involve two parties, the requester and the workers. Some of these platforms provide a set of APIs and frameworks that the requesters could use to formalize the problem and automate their task workflow. This approach implies that only companies or individuals with programming capabilities could enjoy the benefit of crowdsourcing the task to online workers. Moreover, we have also witnessed the emergence of online application store services like Apple App Store, Chrome Web Store, Android Market, and many others which have been successfully delivered hundred-thousands of applications to millions of users.

In this research, we introduce the notion of *human-provided application* (HPA) and the HPA store service which allows publishing and deployment of crowdsourced application in a similar manner as software application. We propose the role of intermediary agent which will act as the developer and publisher of HPA. Currently, this intermediation pattern has also been used in some crowdsourcing services, such as *iStockPhoto*, *Threadless*, and *Microtask*. But these services only address specific problem domains. The concept of this HPA platform will allow development of crowdsourced applications for any problem domains. We argue that this approach could unleash the potential of millions of common Internet users to participate in the crowdsourcing market place as requesters, hence generating more traffic and transactions in the market place.

Furthermore, we also envision the possibility of mixing software-based services and human-provided services (HPS) [1] as online workers in this crowdsourced application. In this work, we adopt the *Social appWork* construct for overall application architecture. This construct contains an application or system that is augmented by a human compute unit that support specific work-style [2].

2 Motivating Scenario

Consider the following simplified scenario. Bob, an executive manager in Vienna, plans to do a business trip to some cities in the United States. For this trip, he need personal assistant who will assist him to plan the travel and arrange some business meetings. Instead of hiring personal assistant staffs, he opens and browses the HPA

store and finds a *Personal Assistant Application*. He decides to buy and download this application. In the mean time, millions of online workers (human and software) have registered their services to the HPA store. Many of them have specified that they have capabilities to serve travel planning and event organizing activities.

When Bob initialized the application, with service discovery algorithm the HPA platform chooses two US-based workers with travel planning and event organizing capabilities and one software-based service with calendar organizing capability. The HPA platform will then construct the virtual team which consists of these chosen services. The human-based workers are then notified and download the worker application stub to their workstation devices. During the execution of this application, Bob and his virtual team use the provided application to collaborate and organize his business trip.

3 Challenges and Preliminary Approaches

We investigate some important challenges and brief some preliminary ideas on how these challenges can be addressed.

Application and task modeling. One of the main challenges of this research is to develop a modeling framework for the *Human-Provided Application.* This framework can be used to model the application workflow and interaction between end-users, service providers, and workers. We propose to use metamodel approach for this framework so that it can incorporate various modeling language. Any application model must conform to this metamodel so that it can be integrated to the HPA platform. With this metamodel approach, it will be also possible to adopt open standards for task modeling such as BPEL4People and WS-HumanTask.

Store front. Finding a suitable application with appropriate contract of service for a specific requirement may not be an easy task for end-user. Assisting end-user with an efficient recommender system is one option. The utility-based recommender technique could be suitable for our purpose. This technique will match user's need and the set of available options based on computation of the utility of each object [3].

Task and service discovery. One of the problems with existing crowdsourcing platform is that the workers have to browse over the task lists repeatedly in order to find an appropriate task to solve [4]. In the HPA store, during registration the worker has to specify the services that he/she is committed to work on. A discovery algorithm can be employed to automatically match between tasks and services [5]. Furthermore, we could also think of the worker services as mobile distributed web services and adopt dynamic mobile web-service architecture such as ACCUSO [6].

Execution management. To ensure the quality of service during the execution of the HPA, somebody must take the role as manager. The application model should support manager role in the execution of the application and take care the interaction between manager and other elements of HPA. It is also possible to crowdsource this manager role and discover it from the cloud.

References

1. D. Schall, S. Dustdar, M.B. Blake. "Programming Human and Software-Based Web Services". *IEEE Computer*, July 2010.
2. S. Dustdar, K. Bhattacharya. "The Social Compute Unit". *IEEE Internet Computing*, 2011.
3. R. Burke. "Hybrid Recommender System: Survey and Experiments". *User Modeling and User-Adapted Interaction*, pages 331-370, 2002.
4. K. Chen. "Human Computation : Experience and Thoughts". *CHI 2011 Workshop*, pages 7-9, 2011.
5. D. Schall. "Human Interactions in Mixed Systems - Architecture, Protocols, and Algorithms". *PhD Thesis in Computer Science, Information Systems Institute, Vienna University of Technology (TU Wien)*, Vienna, Austria, Jan. 2009.
6. D. Schall, R. Gombotz, C. Dorn, S. Dustdar. "Human Interactions in Dynamic Environments through Mobile Web Services". *IEEE International Conference on Web Services (ICWS)*, page 912-919, 2007.