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WT2.7: Blekinge Institute of Technology, Karlskrona, Sweden

Report

Activities performed during the visit

in Karlskrona, Sweden

period: 22.11.2014. – 05.12.2014.

author: Łukasz Falas

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Personal Information

Mr./Ms. Łukasz Falas, faculty member of Politechnika Wrocławska, Poland visited Blekinge Institute of Technology, Sweden in the period from 22.11.2014. to 05.12.2014. in order to carry out research and training activities in the field of SOA-based solutions, QoS-aware Web Service composition, machine learning, big data analysis and utilization of dynamic social network analysis method in service-based systems.

Information about Seminars

The seminar presentation was organized on 27.11.2014.

It was entitled: Quality of Service Management in service-oriented systems

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Description of scientific activities

(Please describe value added to the ENGINE project i.e. new knowledge, new skills with respect to the objectives of the project, the assigned common area of future cooperation with the partner, plans for common research, projects, publications and how it could be used in the scope of ENGINE)

During the visit I have met several people with whom I was able to discuss various research topics and collaborate. In order to identify common field of interest at the beginning of my visit several general talks about my research area and my current results were carried out with prof. Bengt Carlsson, dr. Henric Johnson and Fredrik Erlandsson, a PhD student. Thanks to those meeting everyone was able to get a better understanding of the research conducted by each of participants. During the meeting I have become more familiar with Fredrik's social data gathered from Facebook by his web crawler and with the social network analysis methods he is researching. The meetings have also shown that the initial idea of utilization social networks analysis methods, that are being developed at BTH, to analyze the behavior of services in service-oriented systems in order to predict its impact on QoS parameters did not fit to the research works currently conducted by the group at the university. However, during our talks another very interesting idea appeared and we decided to develop it further, because it was beneficial for both, mine and Fredrik's, doctoral theses.

The research which was started during my visit at BTH consists of two parts. First part focuses on social network analysis on the basis of Facebook data provided by the partner and the main idea for this research was proposed by me. In this research we will be focusing on analysis of user migrations between groups in social networks. The base assumption for this research is that users are moving between social groups and that we are able to distinct source groups which are shrinking and destination groups which are growing. The main aim of the research is to develop social network analysis methods which will enable the prediction which of the destination groups have the greatest development potential. This knowledge can be used to analyze different social groups that are at the initial phase of their development and which are growing due to user migrations and decide which one of them has the highest growth potential to be able to decide where we should invest our resources. One of the examples where such analysis could be useful are various Facebook pages on which we would like to advertise our products. If group of users on one of such page begins to shrink we can analyze where people are currently migrating and predict which of the new sites they are migrating has the highest growth potential and we can invest our money to add advertisements to this page. Another example could be the stock market. If we would have data regarding investments on stock market we could analyze the behavior of groups of investors formed around certain companies and predict in which new companies they will invest their money by tracking the activity of social

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groups formed by them. In this part of research we have distinguished several smaller research question that will be analyzed, i.e.:

- What user types can be distinguished in Facebook data provided by the partner?
- Can we identify any migration patterns between source and destination groups in different time frames?
- Is there a correlation between movement patterns of users from different groups?
- Can we identify which user types have the most impact on the group migration process?
- Can we predict which of the forming groups have the highest potential on the basis of indentified migration patterns?

The second part of the research focuses on the verification of the resource allocation methods for service-oriented systems which I had developed earlier research work. The Facebook data provided by the partners provides a chance to verify these methods on web services processing large data volumes. Due to that fact we agreed that Facebook data gathered by the partner will be provided through a web interface and that we will implement the algorithm from the first part of the research (and possibly other social network analysis methods) as web services. Then I will try to manage the execution of the algorithm developed in the first part of the research with developed resource allocation methods in order to verify the effectiveness of my methods. This research will also enable us to develop a web based environment for social network data and analysis methods which may be developed further and which might shared with other researchers who would like to contribute to it in the future.

Both me and my partners from BTH agreed that the two parts of the research should be described and published as at least two research papers in JCR-listed journals. Both side also agreed that the research will be continued remotely after the visit and that Fredrik Erlandsson will visit Wroclaw during the next year to intensify our research work on this topic.

During my visit a promising research collaboration opportunity appeared also during my presentation at the seminar. One of the participants of the seminar was prof. Kurt Tutschku who was interested in my research work due to the fact that he is working on similar research topics. After the presentation we have arranged a meeting where we have discussed the details of our researches. During the meeting prof. Kurt Tutschku show me some of his work regarding QoS management with the use of peer-to-peer infrastructure for Future Networks. He also shared some concerns on the influence of service virtualization methods on their QoS parameters and he introduced his research results which proven that the use of virtualization can result in nondeterministic behavior of services in certain scenarios. We also discussed the topic of service QoS modeling and QoS values estimation methods which are one of my current research concerns. As a result we agreed that currently used estimation methods are not accurate enough and prof. Kurt Tutschku suggested that I should put even more focus on this topic in my doctoral thesis. We also briefly discussed some of the methods for QoS values estimations used in my research and as a result we developed some initial ideas how they can be improved.

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Unfortunately we were not able to develop our ideas further during my visit, however we are planning to collaborate on that topic in future. Before the end of my visit prof. Kurt Tutschku also provided me with some information on European research projects which focus on topics related to QoS estimation and management that might be interesting for me.

At the end of the visit I also had a discussion with Farnaz Fotrousi who is a PhD student at BTH. The research works conducted by her focuses on finding correlation between QoE and QoS parameters. We have discussed this topic in relation to problems of resource allocation in service oriented systems, however at the current stage of our research we were not able to come up with any common research topic, yet a possible collaboration is possible in future when the results of our current research works will be more mature. During the meeting we also discussed the topics related to FI-STAR project in which she is participating. This topic was discussed because my research team at Wroclaw analyzes the results of this project and plans to utilize them in our future research works. She answered some of the questions regarding Generic Enablers and Specific Enablers created in the project and described the idea of this solution. This meeting was very beneficial for me and my research team, because I was able to gather valuable information about the FI-STAR project and I was able to meet a person who can help us to utilize the results from the FI-STAR project.

Information referring to the intellectual property

(the generally binding low in this area in the visited country and procedures of patenting);

The information referring to the intellectual property were gathered from two sources. First of them was dr. Henric Johnson who is involved in many of the commercialization initiatives at BTH due to his duties as Vice Chancellor. Second one was Mr. Christian Malmström who is a representative of Blekinge Business Incubator.

Intellectual property regulations in Sweden say that anything created by the researcher, varying from basic ideas to fully developed methods, belongs to researcher even if it was developed during work at the university. The same rule applies to anything developed by students during classes. This rule even has its own specific name in Swedish - "Lärarundantag". However it is worth noting that this rule does not apply to commercial research with industrial partners. In this case an agreement on intellectual property rights has to be signed by partners collaborating in the research.

Due to this rule researchers and students in Sweden have many opportunities to develop their idea without the need to sign any formal contracts with the university. In order to support their creativity and chances for commercialization of research results BTH created Blekinge Business Incubator (BBI). The main task of the BBI is to assist researchers, students and other innovators in developing their research results and ideas into products offered by their new companies.

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The process of research commercialization at BTH can be supported by BBI and consists of several steps. In the following section all the step and the role of BBI in them will be described:

1. Preparation phase:
   BBI starts the work with researcher before starting the company. What is more, in order to get help from BBI there is no need to present a business plan like in many similar institutions in Poland.
   The work at BBI starts with validation of the idea. Therefore they suggest to revert the standard company development process. Instead of preparing the prototype of the product they suggest to focus more on the idea and on the clients. To do this BBI first prepares meetings and discussions with experts to develop the idea for the product. They also organize special seminars to teach people how to do this on their own.
   After developing the idea further the BBI is helping to organize meeting with potential customers and to validate the idea during the meeting with potential customers. They are also encouraging people to not to give up after hearing negative opinions about their idea from potential companies. Instead in such situations they help researchers to tweak their idea to fit to the market.

2. Business planning phase:
   After successful validation of the initial idea BBI helps company to prepare business model. In order to do so they arrange meetings which aim to consider all the aspects crucial for the business model. After the initial development of the business process they are starting the "Customer development process". During this phase new entrepreneur with the help of BBI verifies the business model with customers and develops it further according to their requirements. The process is repeated until a successful model is developed.

3. Set-up phase:
   During this phase BBI helps to set up the company. First they help the innovators to prepare shareholders agreements and they provide help with all formal issues regarding the registration of the company. It is worth noting that BBI tries to create a network of people with abilities in talents. In some cases they also use this network to find people who can support the company if the initial group of people running the company lacks some of the required skills.
   In the next step they help the company in finding the founding for their venture. To do so BBI helps the company to prepare a formal business plan to show it to the investors (however there is a growing group of investors who can support a good idea even without a fully developed business plan), After that they introduce the representatives of the new company to the investors and help them to get the founding.

4. Growth phase:
   After setting up the company BBI is still supporting it. They help them to organize the hiring process and participate in interviews with potential workers to help them

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find the most valuable people. Sometimes they also propose them to hire people from their network of experts. Apart from the hiring process BBI helps also in development of the sales strategy and the promotion of the products. They also encourage new companies to find "evangelists" who will also promote their products in various medias.
During this phase BBI also provides offices and meeting rooms for the company.

5. Empowerment phase:
After the successful release of the product and when the company becomes stable it leaves the BBI and starts to work on their own. After leaving the incubator BBI helps the company to form a board which should take the responsibility of verifying the companies development from the BBI. The direct help from BBI stops in this phase, however the company can still seek advice on BBI for its further development.

The whole process of company development (from the preparation phase to the empowerment phase when company leaves BBI) takes about 3 years. The main pillars of the BBI support process are:

- coaching
- providing work places
- providing meeting places

During my visit I was also able to gather some information on patenting procedure. From the formal point of view the patenting procedure is similar to the procedure in Poland. Similarly to Poland it is also difficult to get a patent in the field of computer science. It is important to note that BBI often helps small companies with the patenting procedure. However, BBI itself does not have experts in this field, but they can get a supporting person from outside who will help to prepare a patent application.

It is worth noting that despite the potential help from the incubator, BBI discourages innovators to participate in patenting procedure. They claim that patenting procedure is time and resource consuming, hence if a small company built on innovation is involved in such procedure it will quickly loose the momentum and innovative edge over other companies. From their perspective it is better to focus on development first and get back to patenting when company will have enough resources to undergo this process.

Description of the cooperation between universities and industry

(how it is organized in partner's organization, the sources of funding, the opinions about drawbacks and strengths of existing solution).

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According to the information provided by dr. Henric Johnson the BTH university has around 500 documented collaborations with companies and governmental institutions since its founding. The number refers to all kinds of collaborations conducted by BTH and its partners, from simple seminars to large research projects.

Since the founding of the BTH collaboration with external partners on solving practical problems was very important. Due to that fact the university developed a collaboration model that incorporates various types of partnership and personal exchanges. The main goals of these collaboration initiatives are improvement of the quality of education and research, and development of innovation capacity of BTH students, researchers and partners.

In order to established collaboration with external partners BTH university takes many different actions to encourage them to collaboration. The university organizes meeting and activities with potential partners to develop collaborative relationships, it establishes regional or topic oriented platforms for collaboration with multiple partners and tries to establish formal partnerships with companies, agencies and organizations.

BTH distinguishes two types of partnerships - strategic partnership and area-related collaboration. Further, the collaboration process is well organized and it is divided into three phases: the initiation phase, operating phase and also follow-up and development phase. Also, in all types of partnerships university takes into account several factors important for researchers. Main three of these factors are:

- resource allocation models at the organizational level
- reward systems at the individual level and merit value of collaboration
- terms and forms of personal mobility

To summarize, collaboration with companies and governmental institutions is very important at BTH university and the information that I had gathered indicate that majority of research conducted at BTH aims at solving real-world problems for external partners. The only problem that was pointed out by researchers at BTH is that is not always easy to get access to proprietary company data in order to verify the research results on real data.

Other activities

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REMARK: Apart from this information also a program of the visit and the presentation in electronic version should be given to the project office (please send all of them to Urszula.Markowska-Kaczmar@pwr.wroc.pl). Please respond to the points 1-5 for outgoing visit and points 1-3 for incoming visit. Point 6 is for extra activities that are not put in points 1-5.

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