

XLAB – an SME with expertise in distributed systems and computationally intensive applications

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Abstract. The company and its selected product portfolio are described, along with its brief history, and future plans. XLAB has been focusing on distributed systems since the company was founded in 2001. The company emphasizes the exchange between academia and industry and is successfully applying the knowledge from both worlds in its products. One example of an SOA-based application – PHOV – is presented more thoroughly, while the other are mentioned only briefly. Our future plans focus primarily on specialized Cloud-based development and offerings in local environments of Slovenia and the Balkans.

Keywords: corporate paper, distributed systems, cloud computing, SOA

1 About the company

XLAB is recognized to have one of the strongest computer science research teams outside the academic world in Slovenia. The whole company's team consists of 53 experts in the field of computer science, electronics and mathematics where five hold a PhD in Computer Science or a related field, 6 hold a Master's degree and 6 are post-graduate students.

XLAB has successfully capitalized on the idea of operating a company that acts as a bridge between academia and industry. The internal organization allows for successful and unobstructed innovation, under a close supervision and in accordance with the latest industry standards and protocols. The combination of the two is a key-factor for successful demonstration products, which are with minimal effort transferred into production environment. On the other hand, long-term projects and products benefit from the latest state-of-the-art ideas and approaches, obtained through participation and collaboration in research projects.

Distributed systems are traditionally our primary area of activity. We have a broad know-how in the area of distributed systems, including the Grid and Cloud computing paradigms, and focusing especially on peer-to-peer design paradigm, service-oriented architectures and resource organization and discovery. More generally, our expertise covers Cloud, Grid, and custom distributed systems as well as operating system design and implementation. We have also developed parallel algorithms and used

them for numerical analysis and solving of the optimization problems. Use of artificial intelligence methods resulted in employing of multi-agent and swarm-intelligence approaches to common problems in distributed systems.

The above-given work on distributed systems has been complemented with research and development in computer vision, computer visualization and artificial intelligence, e.g., qualitative reasoning, machine learning, semantic reasoning and evolutionary computing.

2 The product portfolio

To illustrate the relationship between our fields of research interest and our products, we will describe our oldest and most renowned product line followed by the newest one, where both exploit our expertise in the Cloud and SOA technologies.

The first product is the ISL Online [1], a family of business communication products (Light, Pronto, Groop, AlwaysOn), enabling remote desktop support, remote access, online collaboration of teams, and more. Our knowledge in network communication has been used as the building stone for efficiently operating and managing a globally distributed array of gateways, enabling service to more than 90 thousand users of the ISL product family, being assisted by ISL in running and managing a variety of different activities, ranging from daily business chores to mission critical tasks.

The backbone of the ISL family of products has evolved over time according to the latest developments in the fields of Grid and Cloud computing, always ensuring a high level of security, performance and reliability. Designed for fault tolerance from the ground up, the network's architecture includes geographic load-balancing mechanisms, distributed session roaming, and is completely distributed with no single point of failure. The architecture allows for easy scaling, thus ensuring elasticity and enabling hybrid private/public setups of ISL servers for large corporations.

PHOV[2] is the newest product launched by XLAB and recognised as one of the best Slovenian innovations in 2010. It is capable of reconstructing a 3D object from a set of several images taken by an ordinary camera. The images are uploaded through a web form and processed on our servers. The resulting models can be downloaded in one of the popular 3D formats, shared and viewed online (even using the Photastic Facebook application [3]), or printed on a 3D print.

The image processing services can easily adapt to the actual number of requests being processed by exploiting the Cloud elasticity paradigm. On the other hand, an algorithm developed and optimized for execution on a GPU allows for high throughput even on a relatively small-scale privately deployed system. Both approaches provide a fast experience for the user in any scenario, with most time being spent in the image uploading phase.

The difference between our oldest and newest product also shows the paradigm-shift of the last few years – the move to the Cloud. On one hand, the ISL backbone has been steadily updated to the current Cloud-based technology, including the option of deployment in private Clouds. PHOV, on the other hand, has been built on Cloud technologies from the ground up – the private/public cloud bursting (e.g., using

Amazons GPU nodes) is thus trivial, lowering the required capital investment at product launch to a relatively insignificant amount.

3 The current developments and future plans

The tradition to successfully transform internal expertise into products has always required a broad spectrum of evaluation of the current offerings in the fields of interest. XLAB is committed to using the F/OSS tools and technologies for its development in the distributed systems, servers, etc. and also promotes pushing of the changes upstream in order to benefit the community. The support, development and research of the old and new services are currently building on the Cloud paradigm.

We are involved in multiple European projects, which aim at researching and developing new or better platforms that integrate solutions to open issues in the cloud computing (e.g., dependability expressed in a formalised way and fully automated through SLA management and enforcement, expressing the security aspects). These projects provide a perfect area for us to meet and obtain the expertise on the IaaS (and partially PaaS) layer for the currently most important frameworks (OpenStack[4], OpenNebula[5] and Tashi[6]). Implicit cross-framework know-how is used for development of new services – either on the system level or on the application level.

XLAB as a company has a clear internal exploitation strategy of the Cloud paradigm, as it is a part of several projects from this field and has, traditionally, been working on various distributed and parallel systems. The short-term strategy is to become the leading provider within Slovenia and the Balkans region (XLAB is a co-founder of the Cloud Competence Centre), while the long-term strategy is based on multi- and federated- Clouds, where XLAB can offer geographically interesting and also some specialised services.

Extensive experience with all the leading IaaS management frameworks and the underlying supporting components (Ganglia – monitoring, XEN and KVM as hypervisors) are of immense importance to our clients. Such a multi-framework approach enables easy identification of similar components and approaches towards enabling the same functionality on all of the platforms. For example, our extensions of the Tashi framework that enable additional monitoring indicators and provisioning approaches can easily be incorporated into other frameworks.

The monitoring and SLA management and enforcement methodology XLAB is offering is based on our industrial applications (ISL family of products, Gaea+, PHOV, etc.), commercial projects (e.g. algorithms for optimisation of electricity prices in a distributed system, designed and implemented for Borzen) and finally, from the past and present national and EU research projects. As XLAB is usually the technical partner in the latter, we are well aware of the possible pitfalls and have the capability and the know-how to avoid them. The adoption of several IaaS platforms, support for complete vertical SLA management stack, dedication to F/OSS and the persistence to submit our changes to the frameworks upstream count as some of our most significant qualities.

Ultimately, the mixture of the research and commercial projects enable us to identify point of interest for the client and, through knowledge of the technical

solutions, offer the clients targeted solutions that take advantage of the technology, yet do not burden the client with the specifics of the implementation. We find this important since it increases confidence and likeliness that the users will adopt lower-cost, but more efficient cloud computing technology.

Finally, we sum up the research and development path of our company. As you can see, one of our goals is providing the cloud infrastructure. We are currently in the process of setting up the final infrastructure, which should be offered to the public in the middle of September. Our infrastructure will for the beginning offer only simple virtual machines to the users using XEN and KVM as hypervisors. By the end of the year we plan to introduce the complete OpenStack based infrastructure which will act as a parallel to the previous offer, but we obviously plan to move the users to OpenStack. For the first quarter of 2012 we plan to release the first OpenStack and OpenNebula based infrastructure, providing our own API, managing the cross-platform calls. For us, an important part of these developments is our monitoring and SLA framework. Both of them will be able to support (as plugins) the OpenNebula and OpenStack frameworks, thus creating the complete IaaS framework. Finally, we plan to offer consulting services, leveraging the know-how from distributed systems, parallel computing and cloud as well as from other knowledge bases, built within XLAB.

4 Conclusions

In its ten years of existence XLAB has shown that the company can indeed be a bridge between academia and industry. The vast number of fields of interests and expertise does not dilute our goals – it contributes to the transdisciplinary nature of the problems being solved and products being developed.

The current developments in the field of distributed systems are focusing on the Cloud, its various uses and its future exploitation, either in our products, offerings or know-how offered as a consultancy service.

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