SORMA

Scope

During the past few years, the cost for ICT infrastructures have exploded as a result of a „one-application-one-platform" style of deployment. Recent study of corporate data centers reported that the bulk of their 1000 servers just utilized 10% to 35% of the available processing power. Therefore, ICT is undergoing an inevitable shift from being an asset that companies posses (e.g. computers, software) to being a service that companies purchase from designated utility providers in an attempt to reduce costs. The determination of the charged price for software and hardware is essential, as it sets the incentive for resource owners to provide resources as well as for consumers to demand them.

Market-based approaches are considered to work well for price determination. By assigning a value to their service requests, users can reveal their relative urgency or costs to the service. Despite their theoretically excellent properties, only a few market-based approaches have become operational systems. The reason for this lack of market-based operational systems stems from the fact that questions arise particularly concerning the applicability of markets, and their relevance to system design.

In Sorma **the overall objective is the development of methods and tools for establishing an efficient market-based allocation of resources** in a more efficient way in order to **enable resource accessibility for all users** and to **increase user satisfaction, profit and productivity**. The underlying interdisciplinary methodology will ensure that the resource allocation process is autonomously conducted, which leads to the realization of a **self-organizing resource management system**.

Advances

Over a Grid market ICT resources can be supplied as services and client demand can be satisfied across multiple administrative domains. Central scheduling algorithms, applied in conventional IT environments, fail to allocate resources efficiently, if demand exceeds supply. Economic mechanisms can improve allocation mechanisms by setting the right incentives to reveal information about demand and supply accurately. Market or pricing mechanisms foster information exchange and can therefore attain efficient allocation.

Sorma designs and implements an Open Grid Market and will test it in real world use cases. To establish an Open Grid Market in practice, there are several obstacles that have to be overcome. For example, the bidding process is beyond the scope of manual configuration, so there is a need for intelligent tools that reduce the complexity of the bidding process.

The Open Grid Market cannot only be used to allocate idle but all available resources. In this case, ownership of resources no longer plays a central role in the resource allocation process, as the cheapest resources that assure the required Quality-of-Service are allocated to the customers regardless of their originating organization.

Positioning in global context

The Open Grid Market provides a framework to expose resources and services that have been created using a variety of different middleware and service technologies on a technical level and to support different types of market environment on an economical level. The market operator is able to configure several kinds of markets (e.g. spot markets or auctions). The intelligent tools for developed in Sorma are going to make the Open Grid Market flexible and transparent enough for users. To the best of our knowledge, there is no framework for Grid systems supporting on the one hand the design and management of different markets and providing on the other hand intelligent tools for consumers and providers. The implementation of the market platform is based on open standards in order to ensure that Sorma can be adopted widely across different organizations.

Contribution to standardization and interoperability issues

Standardization efforts within Sorma have primarily focused on utilizing specifications from the Open Grid Forum to ensure interoperability of the Sorma deliverables with other EU projects. The Sorma project has continued to participate in WS-Agreement activities at the Open Grid Forum, in particular providing examples of usage of the WS-Agreement specification to the Grid Resource Allocation Agreement Protocol working group. Recent participation has also included discussion of negotiation strategies, based on economic models that could be used to extend the WS-Agreement specification.

Sorma makes use of the Job Submission Description Language (JSDL) to define terms within WS-Agreement. The aim of using JSDL is to ensure that Sorma is not tied to one particular proprietary system, but can be used across different middleware systems.

Target users / sectors in business and society

Sorma's primary target-users are software vendors that provide «Software as a Service». These vendors benefit the most from Sorma's market mechanisms due to the nature of their application and their sensitivity to cost. Other potential users are enterprise organizations with varying computing requirements who need access to low cost computational power and complex services.

Service providers (e.g. Sun Microsystems' network.com) are targeted by the Sorma system as potential computation providers and will gain from Sorma by better utilization of free computational resource and by increasing their business opportunities.

Overall benefits for business and society

Most consumers cannot predict their resource demand. They may have a clear idea of their average need, but still be subject to significant peaks in demand. Buying additional hardware allows the consumers to meet peaks in demand. However, the additional resources may sit idle for much of the time until the next period of heavy demand. Sorma solves this problem by providing a method for bringing such consumers with providers of computing resources together to reduce ICT infrastructure costs and enhance the overall resource utilization. In the context of Green IT, the reduction of costs accompanies the reduction of idle resources, which has an impact on society due to lower power usage.

Examples of use

In Sorma two industry partners, Correlation Systems and TXT e-Solutions, provide use cases. In the following these use cases are described briefly.
Two commercial services from Correlations Systems, which will greatly benefit from the market mechanism of Sorma are OptiTaxi and INtruder:

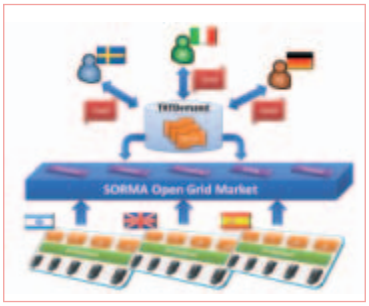
- **OptiTaxi** is a product for taxis that includes a security system for taxi-driver safety (e.g. from hijackers). The system uses an in-car video camera, and sends the video stream back through the cellular network to a data processing center. The video data is analyzed to detect threats to the driver.
- **INtruder** is a security system for detecting internal threats (e.g. inner-office). The system connects to conventional surveillance and access control systems (CCTV, keycard systems, etc) in order to identify subtle or seemingly unnoticeable patterns in behavior and routine of persons.

Both products require a fixed minimum amount of computational resources for standard video analysis. In case of specific human interaction the demand for resources increases which may lead to extreme peaks for detailed object recognition.

Another business scenario taken into account in Sorma is the case of TXT e-Solutions, offering its Supply-Chain applications as a service, namely the TXTDemand application for sales forecasting. Due to the computational-intensive nature of the application, TXT will benefit from the possibility to retrieve resources on the Open Grid Market for running batch jobs on behalf of its customers. Hence, the final price of the service for end-users will be reduced, since TXT will be able to retrieve computational power dynamically instead of having to invest into expensive IT infrastructure.

Achievements

Two major achievements in Sorma to which all partners have contributed: **the Sorma architecture and the Sorma Open Grid Market platform**. In addition members of the consortium have authored over forty scientific publications.
The Sorma architecture describes a generic and open software architecture that can be used as a conceptual blueprint for any Grid marketplace. It comprises four layers: the Grid application layer as the home of the resources and of the applications, the intelligent tools layer with tools to support users' access to the marketplace, the Open Grid Market containing all higher-level services and the Core Market Services layer with the low-level infrastructure services. The general architecture has been released as Deliverable 2.2, which is available upon request from Sorma's coordinator Dirk Neumann (dirk.neumann@vwl.uni-freiburg.de).
The Sorma system can be viewed as a reference implementation of the Sorma architecture. An alpha version of the software has been implemented for internal use as a proof-of-concept and has been presented to the commission. Currently, a second prototype is under development and its completion is expected in Q3/2008 as a beta release. For announcements on the availability of the beta release please refer to http://www.sorma-project.eu.



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