Availability in Industry and Science
- A Business Perspective -

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Abstract. Despite the continuous stressing of security and safety aspects in IT systems, the deployment of highly available services or secure applications is still low. Very often, the economic aspects for the adoption of new technologies are ignored at their conception. New mobility and mobile services will revolutionize our everyday life – only if they come with adequate quality. Standards are an important means to drive the wide adoption of new technology – if backed by industry and research. A good example for such a combined approach is the Service Availability Forum.

1 Where to Start?

Security and safety have been focus areas of computer science from the beginning and a wide range of methods, technologies and products have been developed and are being developed as of today. Fault tolerant computer systems, certified operating systems, processes for the development of safety critical software and associated tools are available.

With a few notable exceptions (e.g. security gateways or cluster systems) all these technologies have one thing in common: their business potential is limited and they have not been adopted on a broad scale.

A number of reasons may be responsible for this effect: technology, cost, know-how, interest, insufficient ease of use or access and many more. In the rest of this paper, we will look at these issues using mobile services and their availability as an example, and show how these issues can be overcome. Although this does offer a very focused view on the wide area of dependability we think that the following thoughts can be broadened to most if not all aspects of security and safety.

We will use a relatively intuitive understanding of the terms availability and mobility in the rest of the paper. For detailed definitions, the readers are referred to more technical papers such as [1].

2 Availability – The Market and Complexities Are Growing

Although it has been said over and over again - our society's dependency upon Information Technology (IT) is still growing. This trend will continue into the foreseeable future. The effects of this growing dependency are felt in everyday life:

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- Chaos rules if baggage cannot be delivered at the airport,
- millions of working hours are lost due to computer viruses,
- billions of dollars are spent to fix bugs in automotive applications.

But: the business potential and the positive effects on life of the increased use of IT for mobile services and for mobility services are far beyond today's imagination:

- ad hoc networks in car to car communication will reduce the time spent in traffic jams,
- remote service using mobile networks will save millions of hours waiting at the car dealer.

At the same time, the technological complexity and the service complexity will increase tremendously. Networks of networks will be formed, speed of communication will multiply, services will be cross connected. New services need to be implemented fast to achieve a short time to market and to create RoI (Return of Investment) quickly.

And there is a high risk that the quality of these services will not be sufficient to be widely adopted. Until now, standards for high-availability components or development environments, though evolving, are not yet widely adopted by the industry. Missing standards means that independent software vendors (ISVs) cannot take advantage of large scale deployments of their high-quality solutions on a number of architectures. Therefore they will only use such tools and methods which do not hinder the easy deployment of their applications.

Without standard availability components and platforms, the implementation of highly available mobile services becomes much more complex and therefore expensive than writing standard quality solutions. And the time to market will increase considerably, binding resources in the development of platforms features. Their proprietary high-availability implementations need to be maintained over the lifetime of a project or product, again making it extremely expensive and taking resources away from the development of value generating service features.

The support for availability features is very limited in standard and widely used development environments such as Java beans or UML. Therefore the integration of high-availability features requires additional efforts, often not spent in the initial phases of a product and extremely difficult to add after a product has been released.

Overall, the know-how about availability and fault-tolerance functions and their implementation is posing a major obstacle to the wide use and deployment of high-quality new services fulfilling the availability requirements of successful, highly scalable mobility and mobile solutions for millions of users.

3 Industry Initiatives Are Under Way, But…

A number of initiatives are ongoing, which address high-availability and reliability aspects in industrial environments. The W3C is specifying web concepts for reliable messaging and transaction support. The PICMG consortium is specifying hardware architectures (Advanced TCA) for the use in so-called carrier-grade environments, i.e. environments showing the same high-availability as traditional telecommunications networks.

The approach, the Service Availability™ Forum (SAForum, www.saforum.org, [2]) has taken, is an excellent example for a focused, but standards based approach to achieve availability levels only known in proprietary telecommunications systems. The initiative was started in 2001 when it became clear that proprietary telecommunications equipments will be more and more replaced by standard IT components. A whole new ecosystem of hardware, middleware and solutions is developed around standards and commercial off-the-shelf IT components. SAForum members are all major IT manufacturers, most major network equipment manufacturers and a number of ISVs. The standards are driven on a marketing level and on a technical level.

The SAForum marketing group promotes the wide adoption of SAForum standards through publications, fair participation, conferences (International Service Availability Symposium), analysts and press briefings. The SAForum technical work group specifies standards for high-availability middleware interfaces, functionality which is in use in legacy telecommunications solutions for a number of years already. The interface categories are:

- HPI (hardware platform interface): specifications for the management of redundant hardware components,
- AIS (application interface specification): interfaces for application developers to create applications with the highest levels of availability,
- SMS (software management specification): interfaces and data structures for the management of redundant, highly available software and hardware structures.

Also on EU level, high-availability is a focus area of research with *IST-2004-2.4.3 - Towards a global dependability and security framework.* This Strategic Objective aims at building technical and scientific excellence, as well as European industrial strength in security, dependability and resilience of systems, services and infrastructures.

Also, the aspects of critical infrastructures have gained a lot of attention recently. The complex interplay between the use of IT and critical infrastructures such as communications networks, finance, air traffic or water supplies are addressed on national and international levels.

4 Integrated Research Is a Must

It should be clear from the above that research needs to take an integrated look at dependability. Of course, a technologically sound basis is indispensable. But to overcome the critical inhibitors of highly dependable mobile services, economic and usability aspects need to be addressed simultaneously.

For each high-availability technology its economic implications need to be discussed. Aspects of adoption, integration with current or new applications, usability are decisive for the success of a new or improved technology.

Key elements of high-availability research need to be:

- Working with standards and industry bodies
- Integration with widely used tools and products
- Dissemination of know-how and expertise
- Economic evaluation of new or updated technologies

- Providing adequate development tools, again with an eye on their integration with widely accepted technologies (Java, UML)
- Supporting the reuse of existing code
- Scalability of solution development as in many cases the acceptance of mobility services is not known in the initial project phases.

The SAForum supports an academic affiliation program to foster a closer cooperation between research and industry. Researchers are invited to participate actively.

References

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