



TAPAS

IST-2001-34069

Trusted and QoS-Aware Provision of Application Services

TAPAS

D17: Updated Dissemination and Use Plan

Report Version: Deliverable D17

Report Delivery Date: March 2004 (Revised May 2004)

Classification: Public Circulation

Contract Start Date: 1 April 2002 **Duration:** 36m

Project Co-ordinator: Newcastle University

Partners: Adesso, Dortmund – Germany; University College London – UK; University of Bologna – Italy; University of Cambridge – UK



Project funded by the European Community under the “Information Society Technology” Programme (1998-2002)

UPDATED DISSEMINATION AND USE PLAN

TABLE OF CONTENTS

UPDATED DISSEMINATION AND USE PLAN.....	2
1. INTRODUCTION	3
2. DISSEMINATION	3
2.1. <i>Dissemination of Research Results</i>	4
2.2. <i>Open Source Dissemination</i>	4
3. EXPLOITATION	5
<i>Industrial Advisory Board</i>	6
<i>Newcastle University</i>	6
<i>Adesso AG</i>	7
<i>University of Bologna</i>	9
<i>University College London</i>	10
<i>University of Cambridge</i>	10

1. INTRODUCTION

Many organisations find it cost effective to outsource their IT applications to Application Service Providers (ASPs). An ASP typically uses middleware and component technologies for deploying, hosting and managing applications of an organization from a centrally managed facility. However, as organisations become global and distributed, such centrally managed hosting solutions will need to be replaced by multi-site, distributed hosting solutions. ASPs are therefore under increasing pressure to be able to host application services that are capable of finding, purchasing and managing services performed by other organisations. The TAPAS partners believe that ASPs will need hosting platforms and solutions that are:

- Highly available, to meet the needs of today's global business environment.
- Secure, to protect the privacy of users and the integrity of the enterprise.
- Reliable and scalable, to insure that business transactions are accurately and promptly processed.

With the above observations in mind, the TAPAS project seeks to develop novel methods, tools, algorithms and protocols that support the construction and provisioning of Internet application services. TAPAS will be developing QoS enabled middleware services that will enable components to be deployed and interact across organisational boundaries. The results of this project will be to provide highly assured mechanisms, protocols and architectures that will help in the deployment of Internet services in Europe. Alongside this will be tools and techniques specifically tailored for the design and evaluation of Internet application services. In order to ensure that those benefits are realised, we need to foster their deployment. This can be achieved in two distinct ways, namely dissemination and exploitation. We describe these in detail in the following subsections.

2. DISSEMINATION

By dissemination, we mean making the results of this project visible to a wide audience. This will be achieved by the following means: (i) publishing and presenting results within the scientific community, (ii) providing input to the open source software development movement, (iii) influencing the relevant standardisation bodies, and (iv) training of students. These points are discussed below:

2.1. Dissemination of Research Results

The research results will be presented at the leading international conferences and in the leading scientific journals to generate a level of awareness and constructive feedback from the scientific community and the industrial research community. The relevant scientific community is in fact at present really a set of almost entirely distinct communities, namely the fault tolerance, distributed computing, software engineering, middleware and computer security communities, each with their own journals, conferences, and workshops. We will therefore seek not only to disseminate our results in these separate communities, but also to contribute energetically to conferences and workshops that seek to attract members from all these communities. Such events include, IEEE/IFIP International Conference on Dependable Systems and Networks, IEEE/IFIP Symposium on Reliable Distributed Systems, IEEE/OMG International Enterprise Distributed Object Computing Conference, IEEE Intl. Symp. on Object-oriented Real-time distributed Computing, IFIP Conference on Distributed Applications and Interoperable Systems and IFIP Intl. Conference on Distributed Systems Platforms and Open Distributed Processing. Members of TAPAS frequently serve as organisers and programme committee members of these events. As an example, we refer to Workshop on Quality of Service for Application Servers, organised by TAPAS members, October 17, Florianopolis, Brazil, in association with 23rd IEEE/IFIP Symposium on Reliable Distributed Systems. Information dissemination will also be carried out through the events organised by the IST sponsored network of excellence on distributed computing, CaberNet, of which many TAPAS partners are members.

2.2. Open Source Dissemination

The Open Source Software movement provides a very interesting new means by which the results of our research could reach, and be taken advantage of by, a very wide audience. The Open Source development process leads to the mainstream availability of reference implementations for innovative industry standards, contributing to the faster development of advanced technologies. The TAPAS project is in a good position to contribute. TAPAS middleware services and architectures will be developed using open source application servers and widely used component technologies such as CORBA and Java. Possible dissemination route could be via the involvement of ObjectWeb (the ObjectWeb Consortium is an open international consortium, hosted by INRIA) and/or via the JBoss application server group, as TAPAS is using JBoss.

2.2.1. Roadmap

TAPAS has decided to use JBOSS application server. Significant amount of software is being developed. This includes: QoS enabled multicast service (deliverable D8), non-repudiated service interactions (deliverable D9), and software services for QoS enabled application server.

As stated in the TAPAS DoW, all this software will be made available as open source (the most appropriate license appears to be LGPL). Our preferred strategy is to make this happen via the JBOSS organisation. We have been in touch with JBOSS, and are currently listed as an academic partner (see jboss.org/company/academia_memberlist). Closer cooperation will be investigated through meetings/teleconferences with the JBOSS team (including Marc Fleury, the team leader) during June - August 2004 period. We expect to firm up our dissemination strategy by September 2004, pending the outcome of these discussions. If these discussions are inconclusive, then we intend to make our software available through the TAPAS web site (under LGPL), with its availability announced through various news groups, and the existing JBOSS link.

2.2.2. Contributions to Standards

The likely future effectiveness of the many and various official and ad hoc standardisation bodies that concern themselves with issues of relevance to our research is difficult to judge, and it would be naïve for us to plan now how best we might seek their approval of the project's intended results. However, we have experience of contributing to standardisation bodies such as the OMG and IETF. For example Newcastle played an active role with IBM, IONA Technologies and others in creating A CORBA standard on extended transactions: "The CORBA Activity Service Framework for Supporting Extended Transactions".

We have frequent interactions with Dr. Mark Little from Arjuna Technologies (member of TAPAS Industrial Advisory Board, and a visiting research fellow at Newcastle University); he is an active contributor to various Web Services standards activities of OASIS, W3C and Java Community Process.

2.2.3. Other

Master and PhD students that work in the project and have an intimate know-how in the technology will be encouraged to take up positions in industry to act as "evangelists" after they finish their university training.

3. EXPLOITATION

In addition to the general dissemination activities outlined above, we have many exploitation routes for TAPAS results through our on going research projects and interactions with the Industrial Advisory Board. We begin by describing the role of the Board; then we describe how the academic partners will exploit TAPAS results and then describe the benefits gained by the industrial partner.

Industrial Advisory Board

The project has formed an Industrial Advisory Board, whose membership represents a cross-section of technology providers and end-users; regular meetings with the Board will help us in revising, where necessary, the objectives of the project.

The role of the Industrial Advisory Board will be to assist the Executive Board:

- with evaluating the direction and progress of the Project,
- with evaluation of the lessons learnt from our planned case studies, and assessment of their likely validity in other environments
- with the development of exploitation plans

The first meeting with Board took place in July 2002, when the an overview of the project and the workplan was presented. Subsequent meetings have taken place yearly.

Newcastle University

The Distributed Systems Group has a strong record of working with industries. In conjunction with Nortel (Harlow research lab), we contributed to the development of the workflow standard by making a submission to the OMG based on our workflow technology (Nortel and University of Newcastle upon Tyne, “Workflow Management Facility Specification”, Revised submission, OMG document bom/98-03-01). As stated earlier, we worked with industry for the development of an extended transaction. Our technologies have been in use in several industrial settings. Results from TAPAS will be used in existing and future research projects on middleware related distributed computing.

HP Arjuna Labs was founded as Arjuna Solutions Ltd., in October 1998 by members of the Distributed Systems Group at the University of Newcastle-upon-Tyne. Arjuna’s founders participated in the creation of an early example of a distributed object transaction system (in 1989), and the first C++ and Java implementations of the Object Transaction Service (in 1997). Arjuna Solutions Ltd. was acquired by Bluestone Software Technologies in July 2000 and six months later, Hewlett-Packard acquired Bluestone resulting in Arjuna being renamed HP Arjuna Labs. The Labs 100% Java implementation of the Java Transaction Service (JTS) from Sun Microsystems, is being sold as part of the resilient pack of the HP-Application Server along with other Java based distributed technology including messaging technology and web services. The recent merger of Compaq with HP led to a major restructuring within HP, with HP pulling out of the middleware business. HP Arjuna lab is now operating as Arjuna Technologies Ltd (ATL) and is based in the University. Close collaboration with the Distributed Systems Group is being maintained ATL has a seat on the Industry Advisory Board.

Newcastle and ATL are taking part in EU Project IST-2001-37126: “ADAPT (Middleware Technologies for Adaptive and Composable Distributed Components)” where there is specific collaboration of trust and security. Newcastle is also taking part in two UK funded projects on virtual organisations that complement the work being done in TAPAS. In particular, in the GOLD project, Web services and component middleware will be used as the enabling technology to develop a set of methods and tools for dealing with trust, security, lifecycle and information management in highly dynamic Virtual Organisations (VOs) in the chemical industry.

Adesso AG

Adesso AG is a full service provider for the design, development and operation of e-business applications. The development paradigm applied is that of component-based software development. This paradigm and the application domain of e-business applications perfectly match because most e-business applications encompass various COTS components. This does not only pose some extra challenges with respect to system integration, release management and test of e-business applications, but it is also hindering the business model ASP for e-business applications. Due to the heterogeneity of e-business application standard ASP service level agreements usually cannot be applied. Instead it is necessary to relate service level agreements to components of an e-business application individually. This may, for example, mean to define service levels agreements as the following:

- The portal site will be accessible for 98% of the time.
- Access to the e-controlling component is ensured for 90% of the time.
- The minimal recovery time for the access to individual customer data is 20 minutes; the recovery time for profile data is 60 minutes.

This example shows, that different types of functionality ask for detailed agreements. Thus, fine-grained service level agreements help to provide the services needed at affordable costs. Of course, it is possible to offer only more coarse-grained service levels, but this usually leads to cost explosions which are not acceptable for customers. With the possibility to define and implement fine-grained service level agreements developed by TAPAS, Adesso can foster its core business in several ways:

1. It is possible to argue for component-based development of e-business applications, because this is a prerequisite for fine-grained service level agreements.
2. The range of software systems which can be integrated into e-business applications, which are ASP-operated is extended. For the time being, systems whose low robustness endangers the availability of the overall e-business application cannot be integrated. If it was possible to

agree for lower services or such a component, it would be possible to integrate despite its robustness.

3. The ASP services of Adesso will be much more attractive, if fine-grained agreements are possible. In contrast to standard offerings, the ASP levels can be precisely adapted to customer requirements.

While the first and second way to foster the Adesso business cannot be calculated in concrete numbers, the third way is supposed to allow an extra 20% growth in ASP business (after being able to define and implement fine-grained service level agreements).

In addition to these perspectives the results of the second TAPAS year have produced new aspects that adesso will exploit.

Firstly, the trust management scenario is now broken down into supervision and controlling inter-organisational relationships to ensure the fairness of business processes as seen by TAPAS. This is based on the ability to monitor the SLA-fulfilment from outside the ASP, typically by a trusted third party using dedicated TAPAS components to gather and evaluate data and process information. This setup seems to be very promising for certain types of business situations. For example, it is a common problem for insurance companies to assure that their brokers have a ensured quality when accessing the insurance's backend systems. It should be noted that brokers are quite often not employees of an insurance, which leads to obvious trust- and QoS-problems, because brokers have to pay directly or indirectly for using the infrastructure of insurance companies. The same type of problem arises in other sectors of industries where many external business users access a company's service. adesso has a strong knowledge in the insurance sector and plans to offer such QoS-related services to it's insurance clients.

Furthermore it can be observed, that the TAPAS tools and techniques will allow to predict the utilization figures for the existing infrastructure. This will of course help to optimise the resource planning, i.e. it will be safe to run two completely separated applications in the same environment. Due to increased resource utilization costs can be reduced, which shall lead to more competitive offers.

The TAPAS middleware implementation seamlessly integrates with the standardized J2EE environment, which will allow an ASP or application developer to even integrate foreign, non-TAPAS components and services with controlled SLA-fulfilment. This can be achieved by developing a simple interface component in J2EE technology, which is run inside the ASP on a TAPAS-enhanced application server. The requested SLA will then be supervised for this dedicated component. This approach might not allow to reconfigure a weak server to fulfil the requirements but will at least enable ASPs to supervise services they pay for. Hence

integration of services such as payment, rating etc. will be easier to integrate and therefore building new services will be less costly.

A promising approach of the TAPAS middleware implementation lies in the decision that applications are unaware of the TAPAS middleware services. The TAPAS extensions for the application server make use of the interceptor concept and are therefore completely transparent to the application. This offers the possibility to re-use existing J2EE-applications with a TAPAS-enhanced application server with very little or even none overhead. Hence it is simple to demonstrate clients the costs and advantages of the TAPAS-enhanced application server, which will result in extended offers for existing ASP clients.

Besides the comparability of two environments and the beneficial effect of proving the QoS-characteristics of an existing application, there is another benefit from adesso's point of view. It is good industrial practise to run load and stress tests for an application to ensure it's quality. By using a TAPAS-enhanced application server software developers will be able to retrieve detailed and accurate profiling information about the critical spots of their J2EE applications. Hence it will be much easier and therefore cheaper to identify and fix performance bottlenecks and inefficient coding.

This aspect leads to the business opportunity of taking over existing applications into an ASP solution, usually as part of an outsourcing project. Before signing a contract the ASP will be able to run tests and to find out non-obvious characteristics.

Adesso plans to exploit these aspects by dedicated offerings to existing clients. Furthermore adesso plans to extend it's portfolio to related services.

University of Bologna

The research group at the Department of Computer Science of the University of Bologna maintains close cooperation with national and international industries, including Microsoft (Cambridge Research Laboratory) and Sun Microsystems, and national research institutes, the "Fondazione Marconi" and the ENEA (the Italian bureau for new technologies applied to the energy and environment), in the form of joint investigations under contracts and grant programmes.

In addition, this research group is involved in the following two projects, recently approved by their relative funding bodies:

(i) "Information Society - Architectures and Protocols for Replicated Web Services", funded by the Italian Ministry of the Education, University, and Research (MIUR), and

(ii) "Design, development, and evaluation of an infrastructure for supporting mobile, multimodal access to Web services", funded by the Emilia-Romagna County Council.

Both these projects, which are carried out in collaboration with a number of Italian Universities and companies, address issues of design of QoS-aware middleware services and platforms. Specifically, the former project deals with issues of service replication in geographically clustered Web Services, and assumes that the geographical cluster of servers that support those Services can cross organizational boundaries. The latter, instead, addresses issues of Web access ubiquity, and investigates the design of middleware solutions that enable the Web Service designer to meet the so-called Always Best Connected (ABC) requirement in a multimodal and mobile environment.

Owing to their very nature and relative scope, both these projects are planning to use of solutions and technologies which are being developed as part of the TAPAS project; thus, both these projects can notably contribute to the dissemination and use of those solutions and technologies.

University College London

UCL relies to a considerable extent on direct industrial funding and consulting. The knowledge required to be able to provide high-quality consulting services is often produced in projects such as TAPAS. UCL therefore hopes to exploit the results of the TAPAS in the following ways:

- Technology transfer initiatives towards the industry.
- Provision of consulting services to external companies (including education and training).
- Dissemination (consisting essentially of publications and courses).

The Software Systems Engineering Group of UCL is well positioned for this exploitation. It has ongoing research collaborations with a number of industrial partners, including British Telecom, Hewlett Packard Labs, IBM Hursley Park, Kodak, Microsoft Research, UK National Air Traffic Services, Philips, Searchspace, Telelogic, Toshiba Corporation, UBS Warburg, Unipower Solutions and the Zuehlke Technology Group. The TAPAS project partners hope to use these good collaborations as a route for exploiting the knowledge produced in TAPAS. Zuehlke Technology Group has a seat on the Industry Advisory Board.

University of Cambridge

Cambridge University has a plethora of industrial collaborators, and will seek to exploit any and all of its research when appropriate. In this project, links with Microsoft Research may

prove extremely valuable, as they have a research laboratory in Cambridge working in collaboration with the University. As well as this, the Hewlett Packard research lab may also be potential paths to exploitation, given long term relationships with them. Finally, we will be able to use the output of TAPAS within the academic community itself directly to support more performant application services for teaching and research.

The Principal Investigator at Cambridge University is active in the IETF, in the RMT working group (5 RFCs last year), as well as more generally in Transport Area working group. As well as this, we co-chair the Grid High Performance Network research group of the GGF. In these two organisations, we have a direct path to taking group communications protocols to the Internet Standards world as well as to the scientific user community, and we can help with dissemination of results on technologies and techniques for implementing Service Level Agreement.

Cambridge also has another EU project and several PhD students working on a variety of techniques to support Trust in Distributed Systems. As well as working with the partners in the other project, we have been and will continue to publish in academic outlets.

As well as Microsoft Research, who fund several PhDs working in distributed computing in the lab, we also now have a strong working relationship with Intel Research Cambridge (started in the same building as the Computer Lab, after the TAPAS Project was initiated). Their interests in performance monitoring overlap with ours.