Arnaud Contes

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Education

2001 - 04	Ph.D in computer Science : University of Nice Sophia-Antipolis Subject : An Hierarchical, Versatile and Dynamic Security Architecture for the Grid		
	Advisors :	Isabelle Attali	INRIA Sophia Antipolis
		Denis Caromel	UNSA, IUF
	Reviewers :	Hervé Guyennet	University of Besançon
		Jean-Louis Roch	INRIA Rhône-Alpes
	Jury members :Frank LEPREVOST University of Luxembourg		
		Bruno Martin	I3S - University of Nice
		Yves Roudier	Institut Eurecom
		Anne Hardy	SAP Labs
2000 - 01	Master Degree in Computer Science: Networks and Distributed Systems DEA Réseaux et Systèmes Distribués: University of Nice Sophia-Antipolis		
1998 - 00	Bachelor Degree in Computer Science Licence & Maîtrise d'Informatique: University of Nice Sophia-Antipolis		
1996 - 98	General Study in Mathematics and Computer Science		

DEUG Mathématiques et Informatique: University of Nice Sophia-Antipolis

Experience

2005-06 Research Associate, Cardiff University, Wales, UK

18 months EU Provenance Project

The main concept behind Provenance is to enable the recording of the process by which a result was generated. That knowledge is fundamental for many real life applications (science, engineering, medical domain, supply management, etc). Without such information, users cannot reproduce, analyse or validate processes or experiments. I have been involved in the Tools Work Package whose aim is to provide a set of tools allowing the analysis of an application workflow and the visualization of that workflow. The analysis engine makes use of the JESS rule engine to validate a workflow.

<u>keywords</u> : Data Provenance, Rule Engine (JESS), Java, Web Services, XML and related technologies, eXo Portal.

2001-05 Ph.D. at INRIA Sophia-Antipolis - OASIS Project

37 months High-Level Security for Distributed Applications

To facilitate the use of security concepts in distributed application, my Ph.D thesis presents a decentralised security model which takes care of security requirements expressed by all actors (resource providers, administrators, users) involved in a computation. The model is implemented outside the application source code. Its configuration is read from external policy files allowing the adaptation of the application's security according to the deployment. The model has been conceived to handle specific behaviors which could happen during a distributed application life-cycle (use of newly discovered resources, remote object creation). The implementation within the ProActive library has valided the approach and had demonstrated its advantages. Indeed, thanks to its transparency, the model has been seamlessly integrated with the other features of the library (migration, group communications, components, peerto-peer). Benchmarks have consolidated the validity of the approach. keywords : Distributed Systems Security, Meta-Object Programming, Self

keywords : Distributed Systems Security, Meta-Object Programming, Self Defending Objects, Adaptable and Secured Application Deployment, Java, XML, SPKI.

2001 Research internship at INRIA Sophia-Antipolis - OASIS Project

6 months Security Architecture for Mobile Active Objects <u>keywords</u>: Java, PKI, X.509, Meta-Object Programming, Distributed Systems.

2000-01 Sasloo SARL

18 months Co-founder, Webmaster, System Administrator (Linux), Database Administrator/Developer. keywords : PHP, HTML, SQL

2000 **Research internship at INRIA Sophia-Antipolis** - CHIR Project

2 months Application for Visualizing a Human heart in 3D + Time.

The provided software enables users to segment artery centerlines on an image, while being constrained by the multiscale response map. In other words, it allows the user to trace artery from free breathing angiograms (a combination of the cardiac contraction and respiratory motion of the heart). Tracing the same arteries on, at least two images, allows the software to compute a 3D+time coronary tree model.

keywords : GTK+, C, XML, 3D modeling, Stereoscopic Vision.

Technical Skills

Operating Systems	Unix/Linux, Windows.		
Languages & APIs	Java : J2EE, JSP, servlets, AWT, Swing, JMX, Hibernate, Ant, JDO, Portlets, JAXP, JAXB, C#, C, Python, Perl, Shell scripts, UML, SQL, XML, XML Schema, XSLT, GTK+, Qt, LaTeX, ProActive.		
Security-related notions	(S)PKI, X.509, bouncycastle,		
Web and Web Service technologies	(X)HTML, JavaScript, PHP, CSS, CGI. SOAP, AJAX (GWT)		
Eclipse Framework	Eclipse RCP, SWT, GEF.		
Server technologies	Apache, Jakarta Tomcat, Jboss, eXo portal, MySQL, PostgreSQL.		
Rule Engine	Java Expert System Shell (JESS).		
Development tools	JBuilder, Eclipse, Visual Studio .Net, Emacs, GForge or similar, autotools.		
Collaborative tools	CVS, Subversion, Mercurial, Wiki.		
Spoken language	French : mother tong English : fluent Italian : basic level		
Miscellaneous	Administration of Unix systems. Driving Licence (A&B)		

Publications

All my papers are available at http://www-sop.inria.fr/oasis/Arnaud.Contes

► Thesis :

[1] Arnaud Contes. Une Architecture de Sécurité Hiérarchique, Adaptable et Dynamique pour la Grille. PhD thesis, University of Nice Sophia-Antipolis, September 2005.

► Book (Chapter) :

[2] Laurent Baduel, Françoise Baude, Denis Caromel, Arnaud Contes, Fabrice Huet, Matthieu Morel, and Romain Quilici. Grid Computing: Software Environments and Tools, chapter Programming, Deploying, Composing, for the Grid. Springer-Verlag, 2004.

► Conferences :

- [3] Isabelle Attali, Denis Caromel, and Arnaud Contes. Hierarchical and Declarative Security for Grid Applications. In *Proceedings of the International Conference On High Performance Computing*, Hyderabad, India, December 2003. Springer Verlag.
- [4] Isabelle Attali, Denis Caromel, and Arnaud Contes. Une architecture de sécurité déclarative et hiérarchique pour les grilles de calcul. In INRIA, editor, 2ème rencontre francophone sur le thème Sécurité et Architecture Réseau, pages 203–212, Nancy, France, July 2003.
- [5] Isabelle Attali, Denis Caromel, and Arnaud Contes. Deployment-Based Security for Grid Applications. In *The International Conference on Computational Science (ICCS* 2005), Atlanta, USA, May 22-25, LNCS. Springer Verlag, 2005.
- [6] Shrija Rajbhandari, Arnaud Contes, Omer F.Rana, Vikas Deora, and Ian Wootten. Trust assessment using provenance in service oriented application. In Inderscience Publishers, editor, Service Intelligence and Service Science Workshop - SISS 2006, Proceedings of the 10th International Enterprise Distributed Object Computing Conference (EDOC 2006), Hong Kong, pages 1–8, October, 16-20 2006.

► Others :

[7] Isabelle Attali, Denis Caromel, and Arnaud Contes. Security for Distributed and Mobile Active Objects with the ProActive Library. ERCIM News No.49, Special Theme : Information Security, April 2002.

- [8] Laurent Baduel, Françoise Baude, Denis Caromel, Arnaud Contes, Fabrice Huet, Matthieu Morel, and Romain Quilici. Components for numerical GRIDs. Invited paper in European Congress on Computational Methods in Applied Sciences and Engineering, ECCOMAS, July 2004.
- [9] Arnaud Contes. Mécanisme de sécurité pour intergiciel à objets actifs mobiles. Master's thesis, DEA RSD, University of Nice Sophia-Antipolis, June 2001.

► Currently Submitted :

- [10] Shrija Rajbhandari, Arnaud Contes, Omer F.Rana, Vikas Deora, and Ian Wootten. Establishing Workflow Trust Using Provenance Information. Submitted to ICSOC06.
- [11] Vikas Deora and Arnaud Contes and Kifor Tamas and Laszlo Z.Varga and Omer F.Rana and Shrija Rajbhandari and Ian Wootten. Navigating Provenance Information for a Distributed Healthcare Application. submitted to ICSOC 06.

My research interests, centered on distributed computing, involve ubiquitous and dynamic security, middleware and grid computing.

► Ubiquitous and Deployment based security middleware

Security is a key concept as soon as distributed applications are spread on many computational grids. The dynamic nature of grid resources enforces to use a security model and infrastructure that can be easily adapted to dynamically acquired resources. From an execution to the other, acquired resources should change due to concurrent accesses to the grid by external applications or node failures. As a consequence, the security should not be tied up in the application code, but rather easily configurable in a flexible and abstract way, outside application source code.

My works are based on the ProActive library, a project member of the European Open Source Consortium *ObjectWeb*. It is a Java library for concurrent, distributed and mobile computing. A distributed or concurrent application built using *ProActive* is composed of a number of medium-grained entities called *active objects*. Given a standard Java object, there are several behaviours we give it transparently: location transparency, activity transparency and synchronization mechanism. In addition to the proxy pattern, the *ProActive* library uses Meta-Object Protocol to provide additional behaviours to the Java object. Another extra service provided by *ProActive* is to allow a *source-independent deployment*. Mapping between abstract architecture designed within application source code and real architecture of computers is accomplished using external deployment descriptors.

All these features lead to well-known security issues (authentication of users, communications confidentiality and integrity) and some new issues. Security needs are related to application deployment and, as it could be easily changed, security should also be configured outside source code.

Security architecture I work on provides basic security needs and handles Grid specific and current middleware issues. It relies on Hierarchical Security Entities. A Security Entity is an object onto one can express security policies. It is identified by a PKI certificate and owns its security policy. An entity is a recursive definition. It can contain entities and enforce its security policy onto contained entities. By the way, entities can be used to define virtual organizations (Domains), to gather several active objects in a logical entity (Node) or also active objects. If Domains are set up by Grid administrators, Deployment Descriptors are used to set up security architecture at application level. All security policies are expressed in a *Declarative Grid Security Language* which is enough powerful to allow the expression of all security needs related to ProActive features.

Research Activites and Related

Communications

I have had the possibility to present my works in the following conferences :

- ▷ EJCP 2002 Summer School of Young Students in Computer Science,
- \triangleright IPDPS 2003 as student volunteer,
- \rhd SAR 2003, HiPC 2003, presentation of [4] ,
- ightarrow RenPar 2003 as member of the conference organization team,
- ▷ Intech'Sophia 2003 (Sophia Antipolis),

Ubiquitous Security Workshop - Sophia Antipolis 2004, presentation of my Ph.D. work,

▷ Séminaire Sécurité ObjectWeb 2003 ObjectWeb Security Workshop, presentation of my Ph.D. work,

▷ Ubiquitous Security Workshop Organizer and speaker, Sophia-Antipolis, 2004,

▷ **ProActive UserGroup, PlugTest & Contest 2004** member of the organization team and speaker,

 \vartriangleright EC Bridge 2004 as speaker and exhibitor,

 \vartriangleright Journée INRIA-EDF 2005 Presentation of the research done by the OASIS team,

▷ **Grid@Work 2005** Organizing committee member, presentation of my Ph.D work, the EU Provenance Project and their possible integration,

 \triangleright ICCS 2005, presentation of [5],

 \triangleright EDOC 2006, presentation of [6],

► Administrative Tasks

 \rhd I have reviewed articles for the following conferences: CCGrid, Asian, FMOODS, Euro-Par, HPDC.

▷ I have been involved in several projects including CoreGrid WP3 and WP4 - European Project), EU Provenance (WP6 - European Project), Passerelle Internet Sécurisée et flExible (PISE - French Project RNRT). In addition of being member of the technical board, I have also participated in the redaction of technical reports and european project proposals.

 \vartriangleright I have been involved in the organization of the following events :

• RenPar 03,

- ProActive UserGroup, PlugTest & Contest 2004,
- Ubiquitous Security Workshop Sophia Antipolis,
- Security and High-Performance Systems Workshop HPCS 2006

Teaching Activities

I have given more than 150 hours of supervised practical work at the University of Nice Sophia-Antipolis in the following domains:

- 2001 02
 Computer Science (Unix)- DEUG (33h)
 Java DEUG (26h)
 Travaux d'Etudes Licence (4h)
- 2002 03
 Computer Sciences (Unix) (33h)
 Introduction to TheGimp (22h)
 Lexical Analysis (27h)
- 2003 04 Distributed programming & software engineering - (10h)
- 2004 05 Lecture : Distributed programming : Java & RMI - (2h)

I supervised many student research works. These works are about home automation (low-level protocols, home systems, existing applications).

I also supervised several internships in my research project during my Ph.D., on the following topics : Jobs Monitoring, Web-Services, P2P networks.