INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET EN AUTOMATIQUE

Project-Team ECOO

Middleware for supporting cooperative work through Internet

Lorraine

THEME COG

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1. Team

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2. Overall Objectives

2.1. Overall Objectives

Keywords: *collaboration*, *cooperation*, *cooperative editing*, *coordination*, *data replication*, *data consistency*, *distributed enterprise*, *distributed team*, *information system*, *process*, *transaction*, *web service*, *workflow*.

ECOO is interested in the development of cooperative, distributed, and process-aware Web Information Systems.

An Information System (IS) is a particular type of work system that uses information technology to capture, transmit, store, retrieve, manipulate, or display information, thereby supporting one or more other work systems.

The advent of the web has pushed new IS applications as electronic commerce, collaborative editing, e-learning, e-engineering or scientific workflow. A common characteristic of such applications is to be cooperative, i.e. human-centred, and creative by nature and implicating more subtle machine mediated interactions than traditionally.

Such applications are distributed in space (people work in different locations), in time (people work at different time) and they cross organizational barriers, making difficult their coordination and crucial the problems of privacy and trust.

The ECOO approach is characterized by its focus on coordination, a crucial problem due to the lost of natural awareness resulting from distribution in space and time: we are particularly interested in process-aware information systems that manage and execute operational processes involving people, applications, and information sources on the basis of process models.

The work is organized as follows. The axis entitled PROCESS ENGINEERING is concerned with the development of new process models in two main directions: increasing the flexibility of existing process models to support creative cooperative applications as collaborative editing or e-engineering for example, and putting business process on the Web. The axis entitled COLLABORATIVE EDITING is concerned with the development of collaborative editing systems but with a scientific focus on data consistency in peer to peer architectures. The third axis is concerned with GROUP AWARENESS in cooperative applications. Interactions between axes are mainly editing processes between PROCESS ENGINEERING and COLLABORATIVE EDITING, community management in peer to peer context between AWARENESS and COLLABORATIVE EDITING, process awareness between PROCESS ENGINEERING and AWARENESS.

Privileged applications in our target are creative cooperative applications like cooperative editing, co-conception, co-engineering, service orchestration in various domains like Software Engineering, e-Commerce, e-Learning, Architecture-Engineering-Construction.

It is a strategic objective for us to develop software and to experiment it "outside the laboratory". We are mobilized by the "Open Source Software initiative".

3. Scientific Foundations

3.1. Process modeling, Workflow

An important research direction of ECOO concerns the coordination of a distributed team based on an explicit definition of working processes (workflow).

Traditional workflow models [53], if they seem a good starting point for this modelling activity, suffer from a lack of flexibility in both control flow and data flow definition and interpretation; there are too rigid to model the subtlety of interactions characterizing creative cooperative activities.

As a consequence, different approaches have been proposed to extend the traditional workflow approach towards cooperative applications. In this context, our main stream approach is to keep a traditional process description model but with a different semantic for integrating control and data flow flexibility.

Another emerging characteristics of our approach is the consideration that, in a lot of applications, there is not one explicit process, but several interacting processes, potentially based on different models

(functional, state-based, dataflow), and in some cases not explicitly defined.

3.2. Cooperative transactions

To be able to define properties of workflow executions, activities are generally considered as black boxes executing as ACID transactions. Unfortunately, ACIDity seems antagonistic with cooperation, cooperative processes being of long time duration, of uncertain development, dynamically defined, mobile ... Especially, the Isolation property seems problematic for interacting activities exchanging intermediate results in complex feedback loops. To surpass the limits of traditional transaction models, several well founded or exotic models have been proposed.

Regarding the transactional problematic, in the vein of [46], and in the aforementioned objective of multi-model process integration, we are concerned with the concurrency control and atomicity of transactional processes. This can be sketched in a top-down or in a bottom-up perspective. For both perspectives, we are developing a transactional framework to provide active support for transactional activities composition and composition evaluation.

3.3. Software configuration and version management

One domain in which cooperative work is organized since a long time is the software development domain. Tools like CVS are used since several years by thousands of software developers. We can even say that the *copy/modify/merge* paradigm is one of the more concrete implementation of cooperative work at a large scale. However, we have to note that this model, which synchronizes one entity at a time, if it is highly operational, suffers from some weakness regarding consistency of shared data.

The copy/modify/merge paradigm has deeply influenced our view of cooperation. But our objective is to integrate it in a more global vision for better taking into account semantic links between two or more objects, and better integrating asynchronous work phases with synchronous phases.

3.4. Real time synchronous editors

Synchronous editors allow to maintain as soon as possible the consistency of two or more copies of the same object that are concurrently modified at the same time by several users distributed through a network. Algorithms are founded on the fusion of execution traces.

We use trace fusion algorithms for everything that requests a synchronous view of several user modifications including the synchronous visualization of divergence between users modifying asynchronously copies of the same object. We extended these algorithms for assuring a smooth and consistent transition from asynchronous to synchronous phases, especially for the reconciliation of divergent copies. We have developped a technology for specifying and implementing a generic and secure synchronizer.

3.5. Usage analysis

Cooperative work includes an important human dimension. A bad apprehension of this dimension leads inevitably to the rejection of any software solution on the field. A good study of actual usages before, during and after development is predominant.

Usage analysis is more a research topic in social sciences than in computer sciences. Our approach is to involve potential users early in the development process (participative design). Also, we ask specialists (psychologists, educationists), when possible, to conduct these analyses. We have had the opportunity to develop this strategy thanks to scientific and industrial relationships.

4. Application Domains

4.1. Application Domains

Our work aims at supporting creative cooperative applications of various natures: co-design, co-engineering, e-learning, cooperative authoring for participants distributed in time, space and eventually in organizations. It corresponds to enterprises cooperating through Internet to the design and/or development of a common product (e-commerce, business process, cooperative software development, co-design and co-engineering ...).

5. Software

5.1. Introduction

All the software listed in this section have not reached the same level of diffusion. Bonita is distributed with a LGPL License as an ObjectWeb project and continues to evolve without ECOO direct implication. LibreSource has been released with a QPL License. jXyDiff is a library distributed by INRIA. PROM is a joint work within a community of people involved in process mining. WSCompositionEditor and SAMS are prototypes in which we feel a lot of possibilities.

5.2. Bonita flexible workflow management system

Participants: François Charoy [responsible], Claude Godart.

The Bonita workflow model is defined as a classical graph based one, but with an advanced execution model that allows different kinds of execution strategies: from classical and automatic, to less constrained user driven. Another difference with classical models is that process definition can be dynamic: Bonita supports direct process instantiation and execution. A new process can be created by cloning another running or finished process and then adapted to specific needs. Process fragment importation is also possible. Bonita is implemented on a J2EE application server. It is available on Jonas. It provides a definition and an execution API available as a session bean and as Web services. Integration of external components can be done inside activities using the BeanShell scripting language. Bonita is available as an ObjectWeb project on the ObjectWeb forge (http://bonita.objectweb.org/).

5.3. LibreSource: services for hosting virtual teams

Participants: Pascal Molli [responsible], François Charoy, Claude Godart, Florent Jouille, Gérald Oster, Pascal Urso.

LibreSource allows a virtual team to organize and its participants to cooperate. Its objective is in the vein of BSCW and SourceForge, but with an original object sharing model where copy convergence is based on the operational transformation approach which provides for a safe and generic synchronizer. In other words, LibreSource is not restricted to the synchronization of source code, but can apply to any type of data (XML for example) if the corresponding transformation operations are provided.

Another innovative point is the fact that the synchronizer can be distributed on several sites, thus providing for the modelling of (hierarchically organized) processes.

LibreSource also integrates traditional services for object sharing, communication, task management and group awareness.

LibreSource (http://www.libresource.org/) is implemented on a J2EE application server. It is available on Jonas.

5.4. jXyDiff: XML diff. algorithm

Participant: Pascal Molli [responsible].

jXyDiff is a Java implementation of the XyDiff algorithm [42] which provides for finding differences between XML files. It has been implemented in cooperation with the Gemo project of INRIA Futurs.

5.5. PROM mining plug-ins

Participants: Walid Gaaloul [responsible], Claude Godart, Mohsen Rouached.

We have provided the PROM framework with mining plug-ins, the goal of which is to extract a process model from a given event log without using any additional knowledge of the process.

The ProM framework (http://www.processmining.org) is a pluggable framework developed by a community concerned with process mining. It supports a variety of process management techniques and can be extended by simply adding plug-ins. Currently, more than 30 plug-ins have been added. The architecture of ProM allows for five different types of plug-ins.

5.6. WSCompositionEditor

Participants: Olivier Perrin [responsible], Sami Bhiri, Claude Godart.

WSCompositionEditor allows a designer to graphically compose (Web) Services with patterns for defining Composite (Web) Services. Service descriptions can be refined with transactional properties. The editor is associated an environment allowing simulating the transactional behaviour of Composite Services, i.e. how they globally behave in case of failure. Simulation is based on an extension of Bonita (http://bonita.forge.objectweb.org/) with plug-ins to manage transactional properties. This extended Bonita can also be used as a process engine to execute composite services. All is written in Java.

5.7. SAMS: Synchronous, Asynchronous, MultiSynchronous editor

Participants: Pascal Molli [responsible], Gérald Oster.

In the context of cooperative work, a team alternates divergence phases where each member works in insulation on copies of objects and convergence phases during which the group reconciles and validates data. To support this style of work, we propose the concept of SAMS environments. A SAMS environment allows team members to work in Synchronous, Asynchronous or Multi-Synchronous mode while ensuring the coherence of shared data. Users of SAMS environment can choose interaction mode according to their needs, and the environment will ensure the coherence of data. Sams is available freely at http://woinville.loria.fr/sams.

6. New Results

6.1. Process engineering

6.1.1. Introduction

Processes have yet received a lot of attention in the last decade and succeeded in proposing workflow solutions for office automation. The topic is subject again to a lot of interests carried by the expansion of business on the Web, but with the need to satisfy new application requirements and execution contexts. We are interested in different aspects of process engineering: the introduction of the flexibility requested to model the subtlety of user interactions in creative applications; the modelling and implementation of consistency properties as requested by complex transactional processes; the composition of existing process fragments of different nature and models; the abstraction of a global view from a process set; the adjustment of processes with regards to real mined executions; the discovery of process models from execution logs; the evaluation of privacy violation risk with regards to the degree of details exposed in process descriptions; the integration of process with data flow. In addition, most of these aspects must be considered in a decentralized context in the frame of Web services and peer to peer architectures.

We can classify this year results in three folders. The first concerns flexibility (spheres of flexibility, constraints based coordination, process discovery and enhancement). The second concerns composition of process fragments with behavioural guarantees (composition of services with transactional properties, process discovery and enhancement, validation of Web services composition). The third concerned the decentralized definition and enactment of processes (while this last point is less mature than the two first, it seems to us very promising).

6.1.2. Spheres of flexibility

Participants: François Charoy, Adnene Guabtni, Claude Godart.

An important approach that we are exploring to better support process flexibility is based on the idea of a sphere. A sphere is a subset of activities of a given process to which we want to attach some constraints, execution properties or qualities. They can be of different nature. For instance, we may want to control concurrency of data access for a given set of activities. This is what we are trying to achieve with what we call spheres of isolation [23]. Spheres of isolation are a mean to express, independently of the process, the way activities can exchange data inside the sphere and with other activities or spheres. They can also be adapted to a distributed setting based on Web services [22]. This works aims to propose a generic coordinator to enforce these properties depending on the defined protocol.

6.1.3. Constraints based coordination

Participants: François Charoy, Claude Godart, Adnene Guabtni, Hala Skaf.

Current work on business process modelling and execution provides an insufficient answer to the more general problem of coordination of cooperative activities. A cooperative process that involves people trying to cooperate to reach a common goal requires reconciling two opposite requirements: control of the execution and flexibility. Our work tries to find the balance between these two dimensions.

We consider a cooperative process as a set of unstructured task that have to be executed to achieve a given result. Then we allow team members and process designers to put constraints on the way these activities can be executed [13].

This may be applied to different kind of workflow, as scientific workflows where data exchange is an important dimension [20], or editing and e-learning processes as in [8], where deontic logic is used to constrain executions.

6.1.4. Composition of services with transactional properties

Participants: Sami Bhiri, Claude Godart, Olivier Perrin.

This work is in the continuation of previous ones regarding the enhancement of workflow models with transactional properties for asserting transactional properties and supporting reliable executions. We have put this work in the context of service oriented architectures. The complexity is there increased due to the autonomous behaviour, the heterogeneity, and the dynamic nature of compositions of services.

A service is enhanced with transactional properties: pivot, compensatable, and retriable. Thus, a composition of services is considered as both a workflow of services and as a structured transaction where all the services are playing the role of sub-transactions. Once they have defined a composition, and they have choosen a set of services, the designers can specify the set of termination states in which they accept the composition to terminate. We have written an algorithm that allows, given a set of chosen services, to validate a composition with respect to the termination states. We are also able to ensure that the execution will be carried out in accordance with its definition.

Composition and validation can be based on so-called transactional patterns [10], [11] that extend workflow patterns with transactional properties.

6.1.5. Validation of Web services composition

Participants: Claude Godart, Olivier Perrin, Mohsen Rouached.

Based on initial work on service composition, we explore the validation of realistic web services compositions, typically described in WSBPEL. We propose to transform process (basic and structured activities) into a set of event calculus predicates. Thus, from this point, we can reason and verify a WSBPEL process regarding static properties (liveness, deadlocks, and unused branches) and non-functional requirements (typically transactional ones) [34], [35].

Combined with our process discovery techniques, we are also able to verify dynamic properties (comparing events that truly happen to the predicates of the process definition) [31], [33].

6.1.6. Process discovery and enhancement

Participants: Walid Gaaloul, Claude Godart, Mohsen Rouached.

The continuous evolution of business process parameters, constraints and needs, initially hardly unforeseeable, requires supports from business process management systems. We have developed a reactive design approach based on execution logs analysis allowing process reengineering and enhancing execution reliability.

We have proposed workflow logs analysis techniques for workflow mining and transactional behaviour improvement [21], [18]. Our approach starts by collecting workflow logs. Then, we build, by statistical analysis techniques an intermediate representation specifying activities elementary dependencies. These dependencies are refined to mine the transactional workflow behaviour.

The analysis of the disparities between the discovered model and the initially designed model enables us to detect design gaps (anomalies), concerning particularly the recovery mechanisms. In function of these observations, we apply a set of improvement and/or correction rules on the initially designed workflow [1], [19]. .

6.1.7. Decentralized processes

Participants: François Charoy, Claude Godart, Charbel Rahhal, Hala Skaf-Molli, Ustun Yildiz.

A promising topic has been initiated this year regarding the enactment of processes in decentralized (at the extreme peer-to-peer) contexts.

This includes a theoretical work for the design of decentralized processes. Some initial results have been produced regarding the decentralization of an initially centralized process model [37]. An original approach based on process decentralization patterns is ongoing.

A study for the definition of a process model for P2P collaborative editing has been initiated. The main driven idea is to base the process flow on the flow of data between workspaces and on the states of these data. This last activity is strongly related to the COLLABORATIVE EDITING TOPIC.

6.1.8. Perspectives

As introduced above, Process Engineering is a very hot topic and perspectives are numerous. ECOO is well positioned on several of these topics. In the next year(s), we plan to address in priority the following questions:

- How to improve process flexibility in terms of model and implementation?
- How to compose existing fragments (services) while guaranteeing properties?
- How to model and enact decentralized processes in terms of organizational constraints and/or architectural constraints (i.e. peer-to-peer architectures)?
- How to abstract a, possibly composed, process model from process execution logs?

6.2. Collaborative editing

6.2.1. Introduction

Cooperative writing is becoming increasingly common; often compulsory in academic and corporate work. Even the World Wide Web or simply the Web becomes a global read-write information space where multiple authors are interacting, in contrast to the traditional model of one author publishing to many readers. People involved in cooperative writing can work across space, time and organizational boundaries with links strengthened by webs of communication technologies. In spite of this need for collaboration, it is surprising to see how poorly computer systems support group activities. Very often, people just send the shared document by mail and use a turn taking strategy to avoid conflicting updates. The existing popular alternatives to the mail approach are tools such as Wikis and CVS/Subversion. In these systems, when concurrent modifications are conflicting, generally one of the modifications is kept while others are ignored. These kinds of lost updates constitute a serious bottleneck for productive work since people cannot work safely in parallel. *A good cooperative editor should allow anyone to write any shared data at any time without lost updates*.

We are interested in three major issues of collaborative editing systems :

1. Managing consistency of replicated data [49] in a decentralized or peer-to-peer context,
2. providing awareness for users in a decentralized architecture (in relation with the GROUP AWARENESS axis),
3. managing collaborative editing processes with a decentralized architecture (in relation with the PROCESS ENGINEERING axis).

The main results of this year concerns the consistency maintenance of replicated data (Tombstone operational Transformations, synchronization WithOut Operational Transformations). A study for the definition of a process model for P2P collaborative editing has been initiated.

6.2.2. *Tombstone operational Transformations*

Participants: Gérald Oster, Pascal Molli, Pascal Urso, Stephane Weiss.

The Operational transformation is an approach [43] [48] allows to build real-time groupware like shared editors. Algorithms like aDOPTed [45], GOTO [49], SOCT 2,3,4 [47] [52] are used to maintain the consistency of shared data. However, these algorithms rely on the definition of transformation functions. If these functions are not correct then these algorithms cannot ensure the consistency of shared data.

Nobody found such transformation functions. Finally, we proposed this year the tombstone transformation functions (TTF). We prove with the SPIKE theorem prover that these transformations are correct. This result allows deploying correct collaborative editor with algorithm such as SOCT4, aDOPTed, SOCT2 and GOTO. This important result has been published in [6], [28].

6.2.3. *WithOut Operational Transformations*

Participants: Gérald Oster, Pascal Molli, Pascal Urso, Stephane Weiss.

We propose WOOT that is an optimistic replication algorithm adapted to collaborative editors. WOOT is based on a formalization of user's intention. Each atomic operation of data modification is associated to an intention that must be respected on every site. These intentions are directly transmitted to all other users without a central site. WOOT ensures convergence of replicas and preserves intentions of linear data structure. It does not require a central site, continuous global order or state vectors. WOOT can thus be deployed on large scale peer-to-peer networks. From an applicative point of view, we are developing a peer-to-peer Wiki prototype based on WOOT [29].

6.2.4. *Processes for peer-to-peer editing systems*

Participants: Hala Skaf-Molli, Charbel Rahhal.

A study for the definition of a process model for P2P collaborative editing has been initiated. The main driven idea is to base the process flow on the flow of data between workspaces and on the states of these data [27].

This activity is strongly related to the PROCESS ENGINEERING topic.

6.2.5. *Perspectives*

6.2.5.1. Combining TreeOPT and TTF

The TTF approach offers support for decentralized collaborative editing by ensuring correctness of the merging process. The TTF transformation functions are designed to manage only linear structure. Consequently, collaborative editors based on this approach must manipulate a shared text document as a linear structure such as a sequence of characters or a sequence of lines. Many documents we manipulate everyday conform to a hierarchical structure. Text documents can be modelled using a tree, the document being composed of a sequence of sections, each section of a sequence of paragraphs, each paragraph as a sequence of sentences, each sentence as a sequence of words and each word as a sequence of characters. XML documents conform intrinsically to a hierarchical structure.

The GlobIS research group at the Institute for Information Systems at ETH Zurich proposed the TreeOPT approach [44] for maintaining consistency of copies of hierarchical structured documents. TreeOPT adopts a multi-level editing mechanism where a unit of the document is associated with the changes targeting that unit. Therefore, any algorithm designed for linear structures can be applied recursively over the document hierarchy. Our goal is to combine the tombstone transformational approach with TreeOPT. Such a combination will permit to build safe decentralized collaborative editing systems for hierarchical documents. Management of conflicts is improved as by not physically removing deleted nodes during the editing process, concurrent changes performed on the deleted parts of the document are maintained. Moreover, by using the multi-level editing an improved efficiency is obtained compared to approaches that model the document as a linear structure.

6.2.5.2. Compensation in collaborative editing

We are now able to build correct collaborative editors based on WOOT or TTF approach. We now face the problem to integrate the group undo feature [50] in these editors. It means that it must be possible for any user to undo at any time any operation present in the log of a site. Preserving convergence with the group undo feature is recognized as a difficult problem. Current group undo algorithms makes some hypothesis on transformation functions that are not ensured by TTF approach. We are currently working on a new approach based on compensation instead of Undo.

6.2.5.3. Preserving coherence in collaborative editing

During collaborative writing, shared documents are replicated on geographically distant sites. Each user works on an individual copy. This results in divergent copies. Merging techniques such as those proposed by the Operational Transformation (OT) approach reconcile the differences among the replicas and ensure their convergence. Although the merging techniques resolve conflicting syntax, they do not help preserve coherence which is an important aspect of an effective document. Therefore, we investigate the use of ideas from narrative-based writing to improve the coherence of the document during collaborative editing. Narrative-based writing is a new technique for planning documents that enhances the implicit story conveyed by a document to the readers; thereby improving coherence.

6.2.5.4. P2P wiki editor, TTF editor

We are currently developing two new prototypes. One based on the WOOT algorithm and another based on TTF approach. These two prototypes should be released in 2007.

6.3. Group awareness and knowledge-intensive communities

Participants: Sawsan Alshattnawi, Gérôme Canals.

Based on previous work on system support for collaborative knowledge-intensive communities, we have developed an awareness mechanism for a collaborative ontology editor [17]. Awareness in this editor plays a double role: on one hand, awareness is helpful to understand the evolution of the shared knowledge and the occurrence of divergent points of view about this knowledge and on the other hand, awareness is the main source for knowledge discovery and learning about other's activity and skills. In this way, the awareness mechanism focuses on two points:

- divergence awareness makes the divergence occurrence evident, and thus manageable by the participants,
- discussion awareness gives means to understand the evolution of the shared artefacts by linking version lines and discussion/arguments threads.

The system prototype is developed as a Protégé plug-in, and makes use of the Protégé knowledge model. An OWL version has also been developed. This work is done in collaboration with the Lifia, University of La Plata, Argentina.

6.3.1. Perspectives: Awareness for a P2P collaborative editor

Due to their decentralized aspect, P2P collaborative editors offer an increased autonomy to the participants of an editing session. This renders awareness mechanisms even more important than in classical editors. Different specific problems need to be faced in the design of such a mechanism:

- Change awareness: the frequent succession of connected and disconnected period of work raises the need for an efficient mechanism that allows the users to be aware of the changes that occurred to the shared artefact during the disconnected periods. Very few approaches have been proposed for change awareness (eg [51]). Our work is based on classifying change types with the objective of proposing adequate visualisation techniques for each type.
- Conflict awareness: with the increase of concurrent and sometimes disconnected modifications will come an increase of conflict occurrences [30]. In addition, conflict resolution in P2P editors need a special attention to ensure that the chosen solution is the same for all replicas of the conflictual artefact. We are convinced that awareness will play a central role here. Our approach will be based on tagging conflictual artefacts and on notifying the involved users.
- Awareness information dissemination: the underlying dissemination mechanism should ensure that, for a given awareness event, all the relevant users, and only those ones, are notified. This is generally done by identifying groups of participants that share common interests (e.g. edit the same document, work inside the same workspace ...). There is already existing mechanisms that work in a centralized setting. However, an innovative approach is needed to implement dissemination control in a completely decentralized system. Our approach is based on enhancing operation logs with context attributes. Based on these attributes, the goal is to compute locally at each site the list of recipients for awareness events related to a given artefact.

These perspectives are strongly related to the COLLABORATIVE EDITING topic.

6.4. Enterprise interoperability

Participants: Khalid Benali, Nacer Boudjlida.

Interoperability is the ability to communicate, to cooperate and to exchange models between two or more applications despite differences in the implementation languages, the execution environments, or the models abstraction.

We are developing a Model Driven Architecture based approach for model interoperability: We established a translation mechanism that enables enterprise applications to exchange models. Each enterprise application using its own meta-model, our approach is based on meta-model mappings and take benefits from the MDA approach as a formal base that supports our approach for interoperability [3], [9]. Our approach to resolve meta-model mappings leads us to indirectly tackle ontology mapping problems.

This work is developed commonly with the CRAN laboratory in the frame of the Interop NoE (see 8.3.1).

7. Contracts and Grants with Industry

7.1. European IP Qualipso (2006-2010)

Participants: Pascal Molli [Responsible], François Charoy, Claude Godart, Gérald Oster, Pascal Urso.

The goal of the QualiPSo integrated project (No 034763) is to define and implement technologies, procedures and policies to leverage the Open Source Software development current practices to sound and well recognised and established industrial operations.

ECOO is especially concerned with the specification and the development of the Qualipso factory.

7.2. RNTL Xwiki Concerto (2006-2009)

Participants: Gérôme Canals [Responsible], Claude Godart, Pascal Molli, Gérald Oster, Pascal Urso.

XWiki Concerto is a 2006 RNTL project which aims at developing a Wiki web application running on top of a P2P network and supporting mobile users with a variety of devices (from smartphones to desktops). The main scientific challenge is the design and implementation of an optimistic replication mechanism for the dissemination and merge of concurrent updates occurred of different copies of a shared document. This mechanism should not use a reference copy and should support sites that frequently join/leave the overlay network. The partners of the project are: XperNet (XWiki editor), Mandriva (Linux editor), ENST, EISTI, Objectweb and the INIRIA Projects ATLAS and ECOO.

7.3. Framework for Content Management (2004-2006)

Participants: François Charoy [responsible], Florent Jouille.

We contribute to the development of a Content Management System developed by 2ST Enterprise. The organization of the CMS is based on the resource management architecture of LibreSource. It has been developed with Enterprise Java Beans. It is operational on several sites with hundreds of users.

8. Other Grants and Activities

8.1. Regional actions

The COWS action of the CPER Intelligence Logicielle (Software Intelligence, axis (Quality and Safety of software)) is developed by the CASSIS and ECOO projects. Its goal is to study how constraint reasoning can apply to the design of secure Web services. A first objective is to formally specify the composition of web services. A second concerns the coordination of a set of services guaranteeing that executions conform to what is awaited by parties. A last objective is the development of composed services, including exception management.

8.2. National actions

COPS (Composition Of Policies and Services, 2006-2008) is an ARA action interested in modelling security properties, composition of web services integrating security properties and guaranties, and monitoring of services conversations for preserving security policies. Cops involves LORIA Nancy, IRIT Toulouse, LIF Marseille and MS R&D Cambridge.
The RECALL ARC http://recall.loria.fr has started in 2006. We observed that the data sharing in P2P networks relies on a massive replication of data. The main problem is to maintain the consistency of replicates in case of concurrent updates. Unfortunately, existing algorithm do not scale or do not preserve semantic of the application Our objective is to develop new algorithm to deploy collaborative application such as wikis, blogs, CMS or forges on P2P networks.

Ecoo participates to the working groups *Services Web* and *UbiMob* (Ubiquity, Mobility) of GDR I3 and to the GDR MACS ECI.

We participate to several contracts with national enterprises (cf. 7.3).

We collaborate with several French laboratories and universities in the context of the INTEROP Network of Excellence (see 8.3).

Gérôme Canals has been PC Member of Ubimob 2006, the French National Conference on Mobile and Ubiquitous Computer Systems.

8.3. European actions

8.3.1. Network of Excellence INTEROP (2004-2007)

Participants: Nacer Boudjlida [responsible], Khalid Benali, François Charoy, Dong Chen, Walid Gaaloul, Claude Godart, Adnene Guabtni, Olivier Perrin, Pascal Urso.

Goals of Interop (http://www.interop-noe.org/) are:

- the emergence of a lasting European Research community on interoperability of enterprise software applications,
- to create the conditions of an innovative and competitive technology transfer by bringing upstream conceptualisation of business based interoperability,
- to achieve by the end of the project the integration process which will assemble knowledge components (ontology, enterprise modelling, architecture and enabling technologies) and prepare a lasting centre of competence on Enterprise Interoperability with maximum research and audience.

8.3.2. Qualipso(European IP Qualipso (2006-2010)

Participants: Pascal Molli [Responsible], François Charoy, Claude Godart, Gérald Oster, Pascal Urso.

The goal of the QualiPSo integrated project (No 034763) is to define and implement technologies, procedures and policies to leverage the Open Source Software development current practices to sound and well recognised and established industrial operations.

ECOO is especially concerned with the specification and the development of the Qualipso factory.

8.4. International Actions

8.4.1. Rorax project, French-Lebanese program CEDRE (2006-2008)

During collaborative writing, shared documents are replicated on geographically distant sites. Each user works on an individual copy. This results in divergent copies. Merging techniques such as those proposed by the Operational Transformation approach reconcile the differences among the replicas and ensure their convergence. Although the merging techniques resolve conflicting syntax, they do not help preserve semantic coherence which is an important aspect of an effective document. The objective of RORAX is to ensure the semantic coherence of merged documents.

RORAX is a financed by CEDRE, the French-Libanese program of the scientific cooperation. It is a joint project between the university Henri Poincaré and the Libanese University. The responsible of the project in France is Hala Skaf-Molli and the responsible in Lebanon is Hala Naja-Jazzar.

8.4.2. Conference program committees and organizations

We will organize in Nancy the seventh international conference on Web Information Systems Engineering (WISE 2007).

Khalid Benali has been co-editor of a special issue of the ISI journal: Ingénierie des processus d'entreprise et des SI, Vol 11, N°3/2006, member of the Program Committee of Interop-ESA'2006 (Interoperability of Enterprise Software and Applications), March 22-24, 2006, Bordeaux, France, and of several workshops.

Nacer Boudjlida has been program co-chair of the 2nd International workshop on enterprise and Networked Enterprises Interoperability, in conjunction with BPM-2006 and of the Forum of the 18th CAiSE conference(2006). He has been co-editor of the International Journal of Enterprise Information Systems: Special Issue on Interoperability of Enterprise Systems and Applications. He has been or is Program Committee member of the 2nd China-Europe International Symposium on Software Industry-Oriented Education (2006), the 2nd (2006) and 3rd (2007) International Conference on Interoperability of Enterprise Systems and Applications, the 9th IFAC symposium on Automated Systems Based on Human Skills and Knowledge (2006), the 12th IFAC InCOM (Symposium on Information Control Problems In Manufacturing) 2006, and of several workshops.

François Charoy will be local organizer of the Wise (Web Information Systems Engineering) conference and program committee member iof this conference, and of several workshops.

Claude Godart will be general chair of Wise 2007 (Web Information Systems Engineering) organized in Nancy by INRIA and Nancy University. He has been or is program committee member of BPM (Business Process Management) 2006 and 2007, CAISE(Computer Assisted Information Systems Engineering) 2006 and 2007, Collaborative Computing (CollaborateComm) 2006, EDOC (The enterprise computing conference) 2006 and 2007, Electronic Commerce (IEEE CEC) 2006 and 2007, EEE(Enterprise Computing, E-Commerce and E-Services) 2006 and 2007, ICBE 2006 (IC on é-business Engineering) 2006, ICSOC 2006 (IC on Service Oriented Computing), Saint (Symposium on Applications and the Internet) 2006 and 2007, SCC (Service Computing Conference) 2007, and of several workshops.

Jacques Lonchamp has been program committee member of COOP 2006 (Conference on the Design of Cooperative systems) and Web-based Education 2007.

Olivier Perrin is or has been Program Committee member of BPM (Business Process Management) 2006 and 2007, and Wise (Web Information Systems Engineering) 2007, and of several workshops.

Hala Skaf-Molli has been or is regular Program Committee member of ICEIS (Conference on Enterprise Information Systems) 2006, of CONFENIS (Conference on Research and Practical Issues of Enterprise Information Systems) 2007 and of the International Conference on Enterprise Information Systems and Web Technologies.

8.4.3. Postdoctoral cooperation

Sami Bhiri, ECOO PHD has joined in November 2005 Manfred Hauswirth " Web semantics " group at University of DERI, Ireland for two years.

Walid Gaaloul, ECOO PHD has joined in November 2005 Manfred Hauswirth " Web Semantics " group at University of DERI, Ireland for one year.

Claudia Ignat from the Globis (Global Information System) group at ETH Zurich has joined ECOO in October 2006 for one year.

Manuelle Kirsh-Pinheiro from LSR-IMAG has joined ECOO in October 2006 for one year.

8.4.4. Co-directed theses

Thesis of Charbel Rahhal with University Lebanese of Beyrouth (2006-2009): collaborative editing processes for peer-to-peer networks.

Thesis of Ustun Yildiz with University of Luxembourg (2004-2007): process decentralization and decentralized processes.

8.4.5. Cooperation with TU Eindhoven

Walid Gaaloul and Mohsen Rouached have spent several weeks in Eindhoven with Wil van der Aalst group to work on process and Web services mining.

9. Dissemination

9.1. Scientific Community Animation

Khalid Benali is member of the CNU (National University Council).

Nacer Boudjlida is chair of the technical committee of the INTEROP Network of Excellence. He is study director of the master degree Software Intelligence at the University Henri Poincaré Nancy 1.

Claude Godart is head of the recruitment committee of the University Henri Poincaré Nancy 1 (Computer Sciences, 27th section). He is study director of the research master degree "Distributed Services and Networks". He has been member of the recruitment committee of the University of Luxembourg (Computer Sciences, Faculty of Information Systems) from 2003 to 2005. He is member of the Scientific Committee of the Laboratory of Computer Sciences of Littoral (LIL). He has been evaluator for France Telecom R&D (World Class Jury), evaluator for LAFMI (French/Mexican Loboratory), Professor at CEA/EDF/INRIA summer school 2005 (theme: Cooperative Work).

Jacques Lonchamp has been head of the recruitment committee of the University Nancy 2.

9.2. Teaching

ECOO members have responsibilities in several formations from University Henri Poincaré Nancy 1, University Nancy 2 and INPL, at different levels, including third cycle (Research Master, Professional Master, ESIAL, ESSTIN).

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