# Engineering Distributed Objects (EDO 99)
# Workshop Summary

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## 1 THEME AND AUDIENCE

This two-day workshop will provide a forum for discussing principles, methods and techniques for the engineering of distributed objects. The intended workshop audience are practitioners and researchers in software architecture and distributed systems.

## 2 RELEVANCE

Standards for object-oriented middleware, such as OMG's CORBA, Java's Remote Method Invocation and Microsoft's DCOM have developed and matured over the last decade. They facilitate the implementation, execution and communication of distributed objects. Several products implementing these standards are available now and these products are being used in many development efforts in industry. A considerable number of projects, however, fail because they do not consider the differences between designing distributed objects and building applications based on local objects.

Several research communities in Databases and Distributed Systems have picked up on the topic. They are organizing meetings that are concerned with how to efficiently implement middleware, integrate it with databases to achieve object persistence, and how to administer the resulting distributed systems. There is, however, no established community that is looking at distributed objects from a software engineering perspective. We go a step further and argue that neither the problem, nor principles, methods and techniques for the systematic engineering of distributed objects are fully understood.

## 3 WORKSHOP GOALS

This workshop will seek to achieve several goals. We want to develop a better understanding of the differences between designing local and distributed objects. We believe that these differences complicate the engineering of distributed objects and need to be well understood. We want to identify the potential contributions of related research communities to solving the problems of engineering distributed objects and define a research agenda that will lead to principles, methods and techniques for this purpose.

The design of distributed objects is very different from the design of centralized applications. These differences arise for many reasons. Firstly, operation execution requests between distributed objects are by several orders of magnitude slower than local method calls. Secondly, a method invocation between local objects is synchronous while different forms of synchronisation are needed for distributed objects. Thirdly, local objects are active throughout their lifetime, while distributed objects might have to be deactivated when not needed for a certain period of time; hence these objects must be able to store their states persistently. Fourth, objects whose persistent state is updateable might have to be integrated with transaction monitors in order to implement distributed transactions. Finally, object interactions across public networks might have to be secured against eavesdropping, tampering and other security attacks. All these differences complicate the design of distributed objects.

The second workshop goal is the identification of results developed in related software engineering research disciplines, most notably software architecture, that can be applied to the engineering of distributed objects. On the one hand, current research in software architecture is rather general. Architectural styles and architectural description languages are defined so that they can accommodate many different implementations. This generality inhibits the application of these techniques in practice and renders architectural styles and architecture specifications less expressive. Moreover, it restricts the number of analysis techniques that can be applied. On the other hand, the distributed object paradigm is being used in an increasing number of projects. We believe that by targeting architectural styles and architectural description languages towards implementations with distributed objects, styles and descriptions become more expressive and more powerful analyses will be enabled. It would in addition be a powerful route for the transfer of research results into industrial practice and would clearly enhance the state of practice in engineering distributed objects.

The third goal is the definition of a research agenda that will eventually lead to the development of industrially applicable principles, methods and techniques for the engineering of distributed objects. Items on this research agenda may include

- Relation between requirements and distributed object architectures.

- Suitable architectural styles for distributed objects.

- Relation between architecture description languages and the interface definition languages supported by object-oriented middleware.

- Software processes for distributed objects.

- Differences between distributed and local object design.

- Extensions of object-oriented design methods and notations for engineering distributed objects.

## 4 WORKSHOP ACTIVITIES

Industrial case studies have been selected and they will be distributed to all workshop attendees before the workshop. The case study include a DCOM based architecture for exchange of real-time data feeds at the London Stock Exchange, the use of CORBA management of mechanical and electrical engineering data at Boeing, and a CORBA architecture for on-line trading at Bull & Bear. Papers describing these case studies will be made available for participants before the workshop. Participants will be encouraged to study the papers and prepare short presentations that indicate how the principles, methods and techniques they propose for the engineering of distributed objects can be applied to one or several of these case studies.

The presentations will be used to kick off extensive discussions. They will be organized in different sessions. Though the detailed session breakdown will depend on the accepted papers, we currently foresee sessions on

- requirements engineering for distributed objects,

- architectural styles for distributed objects,

- mapping of architecture description languages to distributed objects,

- concurrency and distributed objects,

- testing of distributed objects,

- persistence and transaction management of distributed objects.

## 5 EXPECTED RESULTS

The workshop will develop a better understanding of the problems that occur when engineering distributed objects and in particular the differences between designing local and distributed objects. It will identify routes for the application of software architecture research to distributed objects and lead to the definition of a research agenda for the engineering of distributed objects.

We hope that the workshop will become a focal point for a research community that is interested in distributed objects from a software engineering point of view. We would expect that the workshop will be a starting point for continuous interaction between workshop participants.

The workshop organizers will summarize the result of the workshop and submit a workshop report to ACM Software Engineering Notes. The Case study material and the papers accepted for the workshop will be available from the Workshop web site http://www.cs.ucl.ac.uk/EDO99.

## 6 ORGANIZERS

Wolfgang Emmerich is a Lecturer in the Department of Computer Science at University College London. His research interests include requirements engineering and distributed object-oriented software architectures. Wolfgang is Senior Consultant, Partner and Co-Founder of Zühlke Engineering GmbH. Wolfgang has consulted on several CORBA projects and given numerous industrial trainings and tutorials on OMG/CORBA and distributed object technology.

Volker Gruhn is an Associate Professor in the Department of Computer Science at University of Dortmund. His research interests are software processes for distributed systems, architecture of electronic commerce applications and workflow management. He has been chief technical officer of a German software house called LION from 1992 to 1996. In this position he was responsible for a software development department of 150 people.

## 7 SUMMARY

The proposed workshop covers an important theme of strong interest to industry in a timely manner. It builds on past ICSE workshops while having strong innovative content. It is highly complementary to the main technical programme of ICSE. What is badly needed in software engineering are ways in which industrial practice and academic research can be reconciled. This proposed workshop provides a focal point for such interaction on the engineering of distributed objects.

We hope that this workshop attracts participants, who otherwise would not attend ICSE but for whom the ICSE programme in general would be valuable.