



# ASAP

IST-2001-38059

Advanced Analysis and Specialization for  
Pervasive Systems

## Project Presentation

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Deliverable number:	D1
Workpackage:	Dissemination of Results (WP9)
Preparation date:	1 February 2003
Due date:	1 February 2003
Classification:	Public
Lead participant:	Tech. Univ. of Madrid (UPM)
Partners contributed:	Tech. Univ. of Madrid (UPM)

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Project funded by the European Community under the “Information Society Technologies” (IST) Programme (1998–2002).



**Short description:**

This document, according to the *Guidelines for Preparing Project Reports* provided by the European Commission, is a very short description of the project objectives, approach and expected results, as well as the participants in the project. The Project Presentation has been written in two forms: written document and slides (included as attachments).

**Attachments:**

D1.1 — Project Presentation (written document).

D1.2 — Project Presentation (slides).





**Project number and acronym: IST-2001-38059 ASAP**

**Project title: Advanced Specialization and Analysis for Pervasive Computing**

**Key Action, Action line: 1.1.2–VI.1.1 (FET Open)**

### **Project abstract**

The aim of the project is to achieve a major shift in techniques which enable system development for pervasive computing platforms, identified by the EC as one needing drastic improvements in terms of optimizing development cost, reliability, and time to market. The tendency of current software engineering techniques is to produce bloated systems built from libraries. While this approach can increase productivity, it usually wastes computing resources. Pervasive system developers work on the boundaries of available computing resources, even when these are getting cheaper. Instead of other ad-hoc approaches, this project proposes novel techniques and tools based on the automated generation and validation of specialized systems from general ones, using powerful tools and techniques for static analysis and specialization of systems. This approach provides general optimizations tools, and also opens up new areas in the development of intelligent, user-oriented applications for pervasive computing platforms.

### **Objectives**

The final objectives of the ASAP project are, from more general to more concrete:

1. To automate as much as possible the development of sophisticated and reliable software systems for pervasive computing platforms.
2. To develop a novel method for system development for pervasive computing, based on the automatic generation of specialized systems e.g., from general, already existing ones.
3. To develop a novel integrated tool which implements the above method and make it available to system developers as open source code.

### **Description of work**

The work to be performed is centered around the following areas:

(a) Resource–Oriented Specialization: Since in pervasive systems computing resources are bounded, we will consider existing techniques and we will study new resource–oriented control techniques/heuristics, to better take factors such as size of the resulting program, memory usage, and low-level implementation into account.

(b) Increased precision and efficiency of program specialization: We will improve the precision of specialization by further integration of program specialization with abstract interpretation. We will

improve the efficiency of the specialization process by both the use of more efficient, incremental, analysis algorithms and offline specialization algorithms.

(c) Combined Compile-Time, Run-time Validation: It is essential that the software in pervasive systems is made robust w.r.t. unexpected external values. This can only be done by run-time checking. On the other hand, a completely dynamic (i.e., run-time) checking scheme is not realistic either since it would introduce an important overhead. Thus, we will use a combined approach.

(d) Integrated Analysis and Specialization Tool: We will implement in a single system all the techniques developed in the project. This will be possible by taking the systems previously implemented by the partners as a starting point. This integrated system will provide a unique opportunity for the take up of the results of the project. The system will be made available under GNU licenses.

(e) A methodology for the Development of Pervasive Systems: The techniques and tools developed in the project will be applied to a representative set of applications related to pervasive computing. From this, a novel methodology will be devised.

### **Milestones and Expected Results**

There will be a milestone around month 12 in the project, when most of the initial study of novel specialization and analysis techniques is finished. The second milestone, around month 24, is when the first implementation of the integrated tool is planned to be ready. The third phase of the project will be devoted to the fine-tuning and improvements of the system by the feedback obtained from its usage in realistic, pervasive system applications.

### **List of Participants**

- Universidad Politécnica de Madrid, Spain (Co-ordinator)
- University of Bristol, United Kingdom
- University of Southampton, United Kingdom
- Roskilde Universitets, Denmark

**Total cost: 1.444.959 €**

**Community funding: 1.118.700 €**

**Project Start: November 1, 2002**

**Duration: 36 months**

### **Co-ordinator Contact Details**

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**Project URL: <http://www.clip.dia.fi.upm.es/Projects/ASAP>**



# IST-2001-38059 ASAP

## Advanced Specialization and Analysis for Pervasive Computing Project Objectives



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FET-Open scheme



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### Description of work



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- Resource–Oriented Specialization.
- Increased precision and efficiency of program specialization.
- Combined Compile-Time, Run-time Validation.
- Integrated Analysis and Specialization Tool.
- A methodology for the Development of Pervasive Systems.



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