PEPITO

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PEer-toPeer Implementation and TheOry

D 6.6 Assessment criteria

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THE FIFTH FRAMEWORK PROGRAMME

The Fifth Framework Programme focuses on Community activities in the field of research, technological development and demonstration (RTD) for the period 1998 to 2002

We propose the following four measurable and verifiable objectives to judge the success of PEPITO:

1. The project will develop formal models for peer-to-peer computing that are accepted by the research community and applied to peer-to-peer applications.

2. The project will develop novel distributed algorithms for peer-to-peer computing. As one concrete criterion to judge their quality and relevance, we propose to realize a scalable and robust name/directory service based on these algorithms.

3. The project will provide a language-independent distribution subsystem tailored to peer-to-peer computing (e.g., it provides IP-independent addressing and mobility of services).

4. The project will provide languages and platforms for peer-to-peer computing and show that they are useful by implementing convincing demonstrator applications.

More specifically this is broken down to the following criteria for success of each work package:

WP1: The identification of key issues of peer-to-peer computation and collaboration, and successful distillation of them in formal models. Key issues to be explored include: multicast communication, replicated/distributed state, distributed transactions, probabilistic reasoning, versioning, dynamic binding, dynamic updating, type systems, low-level communication semantics, and privacy and anonymity properties.

WP2: The project will develop novel distributed algorithms for peer-to-peer computing that are adaptive to node failure and network topology. In particular the following will be done:

1- Development of peer-to-peer lookup and directory services that are scalable in terms of memory requirement and number of messages, and with predictable guarantees for arbitrary queries.
2- Development of peer-to-peer multicast randomized algorithms that are scalable with predictable guarantees.

The project will also develop a large-scale simulation environment for experimenting with peer-to-peer algorithms. The results will also be input to WP4 on distributed middleware and to WP5 on application demos.

WP3: The extension of the programming systems Oz and Java/DACE/Scala with facilities for peer-to-peer computing. On the conceptual side, this includes the study of language-related issues such as: marshalling, type safety, failure detection. On the implementation side, work will be based the distribution subsystem (DSS) delivered by WP 4: it will be integrated into Oz, and connected to Java in terms of a library. From Java it will then be used by DACE and Scala. Some of the results of WP2 will be adapted to these frameworks.

WP4: The design and implementation of a distribution subsystem (DSS) for peer-to-peer computing, offering a wide range of services including basic services (message sending, secure network pointers, distributed garbage collection) and a full suite of consistency protocols for stateful data The DSS is language independent. It can be either made available directly to applications (as libraries) or to a (centralized) virtual machine, e.g., JVM, .Net, JoCamlVM, or OzVM. An important design goal is that the DSS be easy to use by any centralized VM, by extending it with a small set of new features and important hooks. The two components, extended VM and distribution subsystem, together realize a general-purpose peer-to-peer programming platform. The DSS will provide the language-independent distribution services for the peer-to-peer enabled programming systems of WP3. These systems in turn will be used to develop novel P2P applications in WP5. It is expected that some of the algorithms developed in WP2 will be incorporated into the DSS.

WP5: The development of a number of demonstrator applications with the programming systems of WP3. The applications should have enough functionality to be a convincing proof-of-concept of the usefulness of these programming systems for peer-to-peer computing.

WP6: Appropriate handling of all project management issues: coordination of partners, timely submission of deliverables, budget management, workshops and other meetings, etc.