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Title: PEer-to-Peer Implementation and TheOry
Survey of formal challenges and solutions for peer-to-peer computation
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| Deliverable no: | D1.2 |
| Title: | Survey of formal challenges and solutions for peer-to-peer computation |
| Workpackage no: | WP1 |
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This deliverable presents a summary of the progress made in Workpackage 1, Formal Models, throughout the project. (Note that the WP1 work on programming languages is now unified into the *Resource Control, Versioning, and Modularity* task of WP3, and so is reported there. It includes an experimental language Acute.)

The main achievements are:

- The completion of a rigorous, detailed, and experimentally-validated failure semantics for the real-world Sockets API and underlying network protocols.
- A demonstration of fully-formal reasoning about an executable-code description (in the Acute/OCaml intersection) of a distributed protocol.
- A new failure detector model has been proposed, that we consider easier to understand, easier to work with, and more natural than existing models.
- A verification of a P2P algorithm, covering static-topology behaviour of the DKS of WP2.
- Implementations of key parts of Chord, Nomadic Pict, and Ambients above Acute and the TCP/UDP/Sockets semantics, drawing together the WP1 low-level TCP semantics, the WP3 work on language design, and an existing P2P algorithm.
- Analysis of P2P and Hybrid architectures for connection-based anonymity systems. has been completed.
- Work on transaction axiomatization has been completed.
- Development of support for executing transactions on top of structured peer-to-peer (P2P) networks.
- Publication of two position papers based on the above.

Together these show the feasibility of working with *fully specified systems*, with rigorous semantic foundations for the underlying TCP/UDP/Sockets networking, for the Acute programming language with marshalling support, and for the P2P algorithms written therein.