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Required foundations for peer-to-peer systems
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Short Description

This report places the foundational work of PEPITO, the initial work of which was described in Deliverable D1.7 “First Progress Report on Formal Models”, in the broad perspective of P2P systems. We begin by recapitulating the characteristics of peer-to-peer systems. We then discuss the nature of foundational work in general, highlighting the different kinds of contribution it can make. The main body of the report, Section 3, discusses the main problem areas in which foundational work is required for systems with the P2P characteristics: techniques for Specification and Correctness of the subtle distributed algorithms that arise in these systems; Probabilistic and Statistical properties thereof; Fault Tolerance; Mobility; and Programming Language Design. We continue by sketching a case study, outlining the mathematical structure that would be required for rigorous specification and verification of the correctness of the Chord Distributed Hash Table algorithm. We then discuss another challenging application area, that of stating and proving properties of P2P systems for anonymity – an intrinsically statistical property, related to traffic analysis. We conclude with a discussion of the relationships to the other Work Packages of PEPITO and a brief summary.

Partner owning:	UCAM
Partner contributing:	EPFL, INRIA, UCAM
Available to:	Public