

TREF: A Threat-Centric Comparison Framework for Decentralized Reputation Models

Girish Suryanarayana, Richard N. Taylor
Institute for Software Research
University of California, Irvine
{sgirish,taylor}@ics.uci.edu

ISR Technical Report # UCI-ISR-06-2

January 2006

Abstract: In a decentralized system, entities, also known as peers, directly interact with each other and make local autonomous decisions towards their individual goals. In an open decentralized system, there is no single centralized authority that can regulate the entry of peers in the system. As a result, the system may contain malicious peers that try to disrupt the system and carry out attacks on other peers. In the absence of a centralized authority that can help guard against such attacks, each peer must incorporate suitable measures to protect itself from such attacks. Trust management mechanisms serve to provide effective countermeasures against the attacks perpetrated by malicious peers. Reputation-based trust models allow peers to determine the trustworthiness of other peers in the system based on their perceived reputations. While a number of decentralized reputation-based trust models exist in the research literature, little effort has been directed towards their systematic evaluation and comparison. In this paper, we present TREF, a threat-centric framework for evaluating and comparing different reputation-based trust models as an initial step towards addressing this need. We also discuss how we validated the TREF framework in the context of four reputation-based trust models. Our evaluation reveals several key benefits of using the TREF framework.