

A Generic Framework for Modeling Decentralized Reputation-based Trust Models

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Abstract: Decentralized applications do not have a single centralized authority that can safeguard peers in the system from malicious attacks. Each peer is autonomous and must adopt measures to protect itself. Reputation-based trust management systems enable peers to develop trust relationships with each other based on their reputations. These trust relationships help a peer determine the trustworthiness of other peers in the system and thus help safeguard itself from malicious peers. A number of decentralized reputation-based trust models have been discussed in the literature. However, a common understanding of what a trust model is and what its constituents are has been lacking. Further, there has been little work directed towards the creation of a generic framework that will comprehensively help to express existing reputation models as well as create new models. In this paper, we present the 4C framework for modeling decentralized reputation-based trust models. The 4C framework builds upon the common functional aspects of reputation models and consists of four generic sub-models that help to express reputation models. The 4C framework is described using an XML-based schema that makes the 4C framework extensible for enabling the expression of new types of reputation models in the future. We have evaluated the 4C framework by using it to describe three decentralized reputation models and have built a 4C editor to facilitate the generation of XML-based descriptions of reputation models. We have also demonstrated how these trust model descriptions can be leveraged to aid the construction of decentralized trust-enabled applications.