A Survey of Trust Management and Resource Discovery Technologies in Peer-to-Peer Applications

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Abstract: Decentralized peer-to-peer (P2P) applications are characterized by the absence of a central authority or infrastructure that coordinates the behavior of entities in the system. These entities, called peers, interact directly with each other and make local autonomous decisions in order to achieve their individual goals. In the absence of a single authority that maintains all the data and handles all the queries, peers themselves are responsible for seeking, storing, and sharing information efficiently. Placing a large amount of information on every peer or broadcasting a request to every peer greatly reduces the performance and efficiency of the system. Hence, it is essential that decentralized applications employ efficient storage mechanisms and reliable search mechanisms. Further, an open decentralized system that does not regulate the joining of peers can be subject to grave risks. In particular, malicious peers may be encouraged to resort to a variety of attacks, including sending spurious information, posing as other peers, etc. It is important for each peer in the system to defend against such attacks. This survey discusses these two essential issues that characterize P2P decentralized applications: storage and discovery mechanisms, and trust management. It identifies and defines key properties for each of these and also summarizes the efforts of the P2P community in addressing these properties by categorizing and discussing relevant technologies and approaches.