Chapter I

Conceptions of Trust: Definition, Constructs, and Models

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Abstract

This chapter introduces the fundamental concepts of trust, with emphasis on their applicability to the e-services platform. This sets the tone for this book and creates a platform from which the topics can be explored more deeply in the other chapters. This chapter presents a description of e-services and trust environments, provides the prevailing perspectives on trust, and introduces a unifying definition that can be used for e-services. Furthermore, the indicators that influence a trust decision when e-service invocation is desired, is specified, and the current trust models are highlighted. These models may be leveraged when designing the architecture for an e-service solution. In addition to being a resource during e-service system design, this chapter focuses on making the reader cognizant of the broader technical and management-related issues surrounding trust in e-services, and providing a common platform for discussion.
Introduction

The concept of trust has been widely studied in many fields, for example, psychology, sociology, business, political science, law, and economics. In computer sciences, trust research and technology is motivated by prior work in all these fields and has created a litany of perspectives and research directions. Research has focused on adapting psychological comprehension of trusting behavior (Castelfranchi & Falcone, 2001; Giorgini, Massacci, Mylopoulos, & Zannone, 2005; Grimsley, Meeham, Green, & Stafford, 2003; Riegelsberger, Sasse, & McCarthy, 2005), on modeling trust interactions using game theory and other economics tools (Fernandes, Kotsovinos, Ostring, & Dragovic, 2004; Kimbrough, 2005), on using logic to create models of trust (Demolombe, 2004; Jones & Firozabadi, 2000; Jøsang, 1997; Marsh, 1994; Millen & Wright, 2000; Simmons, 1993;) and on using definitions of trust to drive systems-based approaches to the management of trust relationships (Anderson, Matyas, & Peticolas, 1998; Blaze, Feigenbaum, & Lacy, 1996; Jøsang, 1999; Ketchpel & Garcia-Molina, 1996; Konrad, Fuchs, & Bathel, 1999; Su & Manchala, 1997; Viega, Kohno, & Potter, 2001; Yahalom, Klein, & Beth, 1993). Thus far, the majority of the efforts have been narrow in focus (Grandison & Sloman, 2000) and oblivious to the ecosystem that must exist for trust to be an integral part of the fabric of the Internet.

Examining the trust problem in the context of e-services is even harder than investigating trust in computer systems because solutions must take into account the dynamic nature of a distributed system, the fact that consumers may be prior strangers, the need to establish trust on both the service provider and consumer side, and the fact that there is a greater incentive to subvert valued, one-off services. These complications imply that there needs to a coordinated, dynamic infrastructure to create, foster, and maintain the delicate web of trust needed to spur the growth of e-services (Grandison, 2003). Current trust technologies focus primarily on only evaluating and establishing trust relationships (Grandison & Sloman, 2000). Our discussion will not only cover these better-known aspects of trust relations, but extend to the broader set of topics pertinent to the e-services environment.

In this chapter, the building blocks for discussion on trust in e-services are discussed. A presentation of the meanings of e-services and trust will be given, followed by a discussion of the elements and nature of a trust relationship and finally, there will be a presentation of trust models relevant to e-services.

Defining the E-Services Landscape

For this discourse, e-services will be defined as functionality that is made available over the Internet. For example, e-commerce transaction services for handling online orders, automatic bill payment services by banks, and application and document hosting by online service providers. Thus, e-services refer to any processing capability that is available online to a consumer.

Figure 1 shows that the concept can be generalized to apply to arbitrary electronic communication media without loss of the core tenet: leveraging network technology to enable
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