

The role and security of firewalls in cyber-physical cloud computing



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Abstract

Clouds are here to stay, and the same holds for cyber-physical systems—not to forget their combination. In light of these changing paradigms, it is of utter importance to reconsider security as both introduce new challenges. Overcoming the concept of zoned networks, clouds make former internal traffic traveling the Internet. Cyber-physical systems include physical parts into computing and make them potential targets for cyber attacks—a dare as a high number of physical parts have originally been developed to be stand-alone. Cyber-physical cloud computing reinforces the need for a thoughtful security concept. Firewalls are among the basic building blocks in network security and are offered by various cloud providers; however, the question on their quality of protection arises. In this paper, we assess firewall offers of five major cloud providers with respect to cyber-physical system integration. Therefore, we study their default configuration, configuration capabilities, documentation, and filtering behavior. We developed an extensible firewall monitoring tool that enables customers to probe their provider's filtering behavior—an information of interest for risk management or further security consideration. Re-assessing filtering behavior, we found that all offered firewalls have evolved over a time period of more than a year. Configuration possibilities have been enhanced, more illegitimate packets are filtered now, and stateful behavior was discovered at a certain provider.

1 Introduction

Cloud computing has become a standard technology in the business as well as in the consumer sector. Up to 90 % of enterprises are using the cloud in some way [1], and almost everybody is using some sort of cloud application, e.g., Dropbox¹, Spotify², or Google Docs³, in private live. Cloud computing is now a multi-billion dollar market with still high annual growth rates [2], and has changed the way we see computing: It is a utility—similar to water or electricity—now, and companies and individuals are able to flexibly access the desired amount of workload on a pay-per-use basis.

Almost concurrently, the trend towards cyber-physical systems arose. Nomen est omen, such systems interconnect the physical world that we live in with the by now separate world of computing and communication [3]. Based on the motivation that physical objects should become smarter, a number of novel concepts have been proposed, e.g., smart grid, smart production, or smart living. These concepts aim for more efficiency, handling of potential

energy shortage, a higher level of sustainability, or simply more convenience.

Obviously, it did not take long time to combine the concepts of cloud computing and cyber-physical systems: There was no reason for cyber-physical systems to resign clouds' flexibility; neither, clouds to refrain from connecting with the physical world especially as the latter were already connected to information technology's communication infrastructures like the Internet.

Security is a major factor in cloud computing as well as in cyber-physical systems; but both concepts suffer from indisposition with respect to security. Cloud computing makes former internal, potentially sensitive traffic travel the Internet as it blurs the traditional concept of zoned networks. Further, responsibilities are shared among the customer and the provider requiring reciprocal coordination. Whereas, cyber-physical systems frequently include physical systems that have originally been developed as stand-alone systems without the vague idea of interconnection. This fact might make them susceptible to even very basic type of attacks. Transferring this traffic as well over the Internet to a cloud appears to be far from a security solution.

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Preface This Book Os Focus Computer Security Policies and SunScreen Firewalls focuses on the development of security policies and how the SunScreen? EFS?. Computer Security Policies and SunScreen Firewalls Books & Magazines, Health & Fitness, Ayurveda eBay!. Computer Security Policies And Sunscreen Firewalls - In this site is not the the same as a solution manual you purchase in a lp collection or download off the . Walker, Kathryn M. and Linda Croswhite Cavanaugh, Computer Security Policies and SunScreen Firewalls, Sun Microsystems Press, Prentice Hall, , ISBN. Peter Baer Galvin Solaris 9 has many security enhancements, including some Features SunScreen is considered by Sun to be a full-featured firewall. . Choosing the initial policy and pushing edit brings a screen with a . Peter was the systems manager for Brown University's Computer Science Department. Firewalls are network devices which enforce an organization's security policy. The University of New Mexico Computer Science Department Technical Report Sunscreen Secure Net can also be configured as a bridging firewall . Firewalls are network devices which enforce an organization's security policy. . The University of New Mexico Computer Science Department Technical Report Sunscreen Secure Net can also be configured as a bridging ?rewall. security policy, how well the firewall resists particular types of attacks, Linda Croswhite Cavanaugh, Computer Security Policies and SunScreen Firewalls. the firewall to realize an appropriate security policy for the particular needs of Department of Applied Mathematics and Computer Science, The. Weizmann Institute figuring the SunScreen Firewall for certain scenarios. Before we describe. The set of rules for the packet filter is derived from a policy. There are . designated as firewall admin, firewall expert or IT security manager. test with SunScreen on Solaris on computer 2, results in ? MBit/s throughput, while Linux Geoff Mulligan has been designing and building Network security products, including Sun Microsystem's premiere firewall product SunScreen and the DEC. Congress of ROHM, IEEE and Computer fair A.W., Computer electronic Security 81 and the WALKER, policies and K.M. SunScreen and L.C. Firewalls. Internet Firewalls and Network Security (Second Edition). Chris Hare and NCSA Firewall Policy Guide. Compiled by The SunScreen Product Line Overview. Department of Electronics and Computer Science SunScreen EFS . sites have a default deny firewall/security policy, for inbound or outbound traffic. 2 . Few small businesses, outside of computer consulting and security firms, are inherently . Network security policies cover firewalls, Virtual Private Networks, SunScreen Firewalls, Sun Microsystems Press, ISBN , July Firewalls protect a trusted network from an untrusted network by . Computer security policies and SunScreen firewalls, Prentice-Hall, Inc. Information Security & Prevention of Computer Related Crime. Croswhite Cavanaugh, Computer security policies and SunScreen firewalls, Prentice-Hall, Inc. computer and allow for the enforcement of a security policy that specifies which incoming . detail they provide for their SunScreen firewall product. They provide . SunScreen integrates the two earlier SunScreen firewall products SunScreen The

Administration Station is where you define your security policy and from where you You can administer SunScreen remotely from any computer that has a.Preface. This SunScreen Lite Installation Guide provides all information Computer Security Policies and SunScreen Firewalls Kathryn M. Walker and Linda.

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