Preface

Before the invention of the World Wide Web, computer communications were mainly associated with the data transmission and reception among computers. The invention of the Web by Tim Berners-Lee in 1989, led to a deep change of this paradigm, imposing the share of information over the data transmission. After the invention of the Web, Internet refers to the global information system that is logically linked through a global unique address space based on the Internet Protocol (IP) and is able to support communications using the Transmission Control Protocol / Internet Protocol (TCP/IP) architecture and/or other IP-compatible protocols, and provides, uses or makes accessible information and communication services world wide.

The World Wide Web, also known as WWW, Web or W3, represents the greatest networked repository of human knowledge accessible worldwide. The Web contains billions of objects and documents, which may be accessed by hundreds of million of users around the world and it became indispensable for people, institutions or organizations. The search of information in the current Web is based on the use of robust and practical applications known as search engines and directories. However, the fast and unorganized growth of the Web is making difficult to locate, share, access, present or maintain on-line trustful contents for an increasing number of users. Difficulties in the search of web contents are associated to the use of non-structured, sometimes heterogeneous information, and to the ambiguity of Web content. Thus, one of the limitations of the current Web is the lack of structure of its documents and the information contained in them. Besides, information overload and poor aggregation of contents make the current Web inadequate for automatic transfers of information. As a consequence, the current Web may evolve for a new generation Web called Semantic Web, in which data and services are understandable and usable not only by humans but also by computers. Moreover, in the future, the Semantic Web may further evolve to a Sentient Web, which is a further new generation of Web with capabilities for sentience.

If, by one hand, the invention of the Web led to the fact that the TCP/IP architecture, which is the support of Internet, is being used in applications for which it was not designed for, by other hand, a large number of new applications have been developed, which led to the rise of new communication protocols that have been incorporated into the TCP/IP architecture. Besides scientific and technological challenges in the development of Web and its evolution, in the framework of W3C (World Wide Web Consortium), in order to explore all its potential, research and development activities have also been observed towards the development of new multimedia applications over the Internet and towards the ubiquity and autonomic systems. The development of these new applications and systems, by their side, require the research of new protocols and technologies, or the integration of existing technologies used in other fields. A strong research effort is also observed in the transport and network layers in order to cope with mobility, guarantee the quality of service or security and privacy for networked applications, and new forms of group communications in the scenario of the exhaustion of the address space at network layer. Besides, intense research activities also have been observed for the discovery of new solutions that led to an increase of the link bandwidth and the throughput of routers and switches.

The functioning principle of Internet is based on the client-server paradigm, in which the client has an active role and the server has a passive role answering to the queries made by the client. Besides the research activities that are being carried out in each layer of the TCP/IP architecture, it may be also observed intense research

activities towards a new kind of networks, called peer-to-peer (P2P) networks. The term P2P refers to a class of systems and applications that use distributed resources to execute some function in a decentralized way, in which each machine may act as a client or a server. Although P2P networks present some problems regarding security and legality, they represent the most advanced stage, in terms of scalability and fault tolerance, in the evolution of distribution multimedia services.

The purpose of the Encyclopedia of Internet Technologies and Applications is to provide a written compendium for the dissemination of knowledge and to improve our understanding in the area of Internet technologies and applications. The encyclopedia presents carefully selected articles from 232 submission proposals, after a double blind review process. It also provides a compendium of terms, definitions and explanation of concepts, technologies, applications, issues and trends in the area of Internet technologies and applications.

The projected audience is broad, ranging from simple Internet users (Internet consumers), which would like to learn more about Internet, to experts working in the areas of networking and Internet technologies and applications. This encyclopedia will be of particular interest to teachers, researchers, scholars and professionals working in these areas, who may require access to the most current information, about concepts, technologies, applications, issues and trends in these areas. The encyclopedia also serves as a reference for engineers, consultants, IT professionals, managers, and others interested in the latest knowledge on Internet technologies and applications.

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Editors