Recalling the Early Days (First Decade) of SIGCOMM and Thoughts on Future Research Directions

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ABSTRACT

ACM SIGCOMM has reached its fiftieth birthday. The field is still remarkably strong, expanding into new disciplines as well as new application areas. Since I was an early SIGCOMM chair (1973-1977), I have been asked to recall the early days and discuss possible future directions.

CCS CONCEPTS

• **General and reference**;

KEYWORDS

CCR and SIGCOMM history

1 INTRODUCTION

After completing my Ph.D. studies in electrical engineering at Stanford University in 1966, I was searching for a new research area—one that would be a good fit for my future career goals. At that time, I was working in the computer industry but interested in research far beyond simply designing larger and faster computers. I became intrigued by the offer of a research position with Bell Labs in New Jersey. The offer came from a newly established data communications group headed up by Ed Fuchs. The group's mission was to investigate issues in computer communications which stemmed from the interconnections of various devices with computers. This is how I first became involved in the field of computer communications.

The group at Bell Labs was working on many new topics—including computer traffic characterization, new multiplexing techniques, computer interconnection problems, and high-speed modems for data communications. Although there were industries producing modems and multiplexers to allow interconnection between those devices and computers, there were many issues that still required solutions. Since these topics were not in the mainstream of existing computer conferences at that time, a new forum was created in order to address those issues. The First ACM Symposium on Problems in the Optimization of Data Communication Systems (SICOMM 69) was formed by Walter Kosinski, Ed Fuchs, and LeLand Williams. That first conference was held in Pine Mountain, Georgia, in October 1969 [1], and it covered a wide range of data communication topics such as computer traffic characterization, statistical multiplexing techniques, local area networks, interface of computer peripherals with communication systems, as well as computer privacy issues. I recall that this first ACM conference held about 100 attendees, and there were many lively discussions from industry participants as well as from researchers in government and academia. Many of the critical problems that needed solutions were discussed. All of the conference attendees felt that such technical exchanges were very useful, and the symposium was a big success. Following this, and because of the growing demand for computer communications as well as computer communication industries, the program committee and organizers elected to hold conferences every two years. The first few data communication symposiums were sponsored by ACM and IEEE. In the mid-1970s, ACM created the special interest group (SIG) for different disciplines, and later in that decade the ACM Special Interest Group on Data Communications assumed the leadership of SIGCOMM. In that same timeframe and because of the increasing interest in the field, IEEE independently formed the IEEE Data Communication Group and sponsored its own Data Communication Conference. I am honored to have been one of the founding members of that conference.

I also had the honor of serving as the SIGCOMM chair from 1973 to 1977. Additionally, I served as the program chair for the Fourth Data Communication Symposium (jointly sponsored by ACM and IEEE) held in Quebec, Canada, in 1975 [3]. The conference consisted of eight regular sessions and a short paper session. It covered such topics as network topological design considerations, measurement and network performance, communication software, network design consideration, security, computer communication standards, interface considerations, and relevant legal and regulatory aspects. Even today, there are still problems in the last four subject areas that require further research. The SIGCOMM symposium has grown significantly since 1969. By 1975, it had an attendance of more that 350 people. Today, the average attendance is over 700.

Inter-process communication is an important design consideration in the planning and designing of distributed systems and computer networks because of its strong connection with the computer operating system. ACM encourages cross-exchange among related SIGs. As a result, SIGCOMM and SIGOPS held a joint workshop in Santa Monica, CA on March 1975 for cross-technical exchanges. The workshop committee consisted of Wesley W. Chu (SIGCOMM chair), Vinton Cerf, T. C. Chen, R. Stockton Gains (SIGOPS Chair), Butler Lampson and David C. Walden. In order to ensure a strong interaction among the participants, attendance was limited to 50 active researchers. Five topics were covered at this workshop: process synchronization, formalism for inter-process communication, protection, inter-process communication systems, and performance.

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The outcome of the workshop was documented in the Proceedings of the ACM SICOMM/SIGOPS Inter-process Communication Workshop [2], which also served as the regular issue of the ACM Operating System Review, Volume 9, Number 3, July 1975. The workshop was a success, and it motivated the initial research of the transport layer protocol, as well as the Internetwork protocol design.

During my early career at Bell Labs (1966-1969), in addition to computer communications, I was also involved in distributed database system research. Computer communications is closely related to distributed systems since inter-process communication is an integral part and plays an important role in distributed systems. For the past three decades, I have also expanded my research to knowledge-based (intelligent) distributed database systems [7, 8], as well as inter-disciplinary systems within the medical field [6]. I found that knowledge-based (AI) techniques such as approximate matching and approximate query answering can resolve many roadblocks beyond using traditional database approaches.

We have observed the evolution and growth of the computer communications area in packet switching [5], local area network, wireless communications [9], and named data networking [4]. These not only provided many valuable and useful applications, but they have also revolutionized the computer communications field. The advances of Web information systems and the "Internet of things," integrated with their associated domain knowledge bases and databases, have greatly expanded data communication applications.

2 LOOKING AT THE FUTURE

As I look to the future, I see that future computer communication systems with multimedia interfaces (e.g., images, maps, free text, voice, etc.) will be useful to many fields beyond engineering, business, and education. They will be useful in the medical field for real-time access to distributed medical records in order to provide expert diagnosis. This can also be expanded to social networking information as well as personal assist systems that improve our lives. These future applications will create new challenges (performance, reliability, security, etc.) and require new innovative research solutions. Knowledge based (AI) techniques, integrated with communication technology and database technology, will be instrumental in resolving those challenges.

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