The Second International Conference on COMPUTERS AND APPLICATIONS

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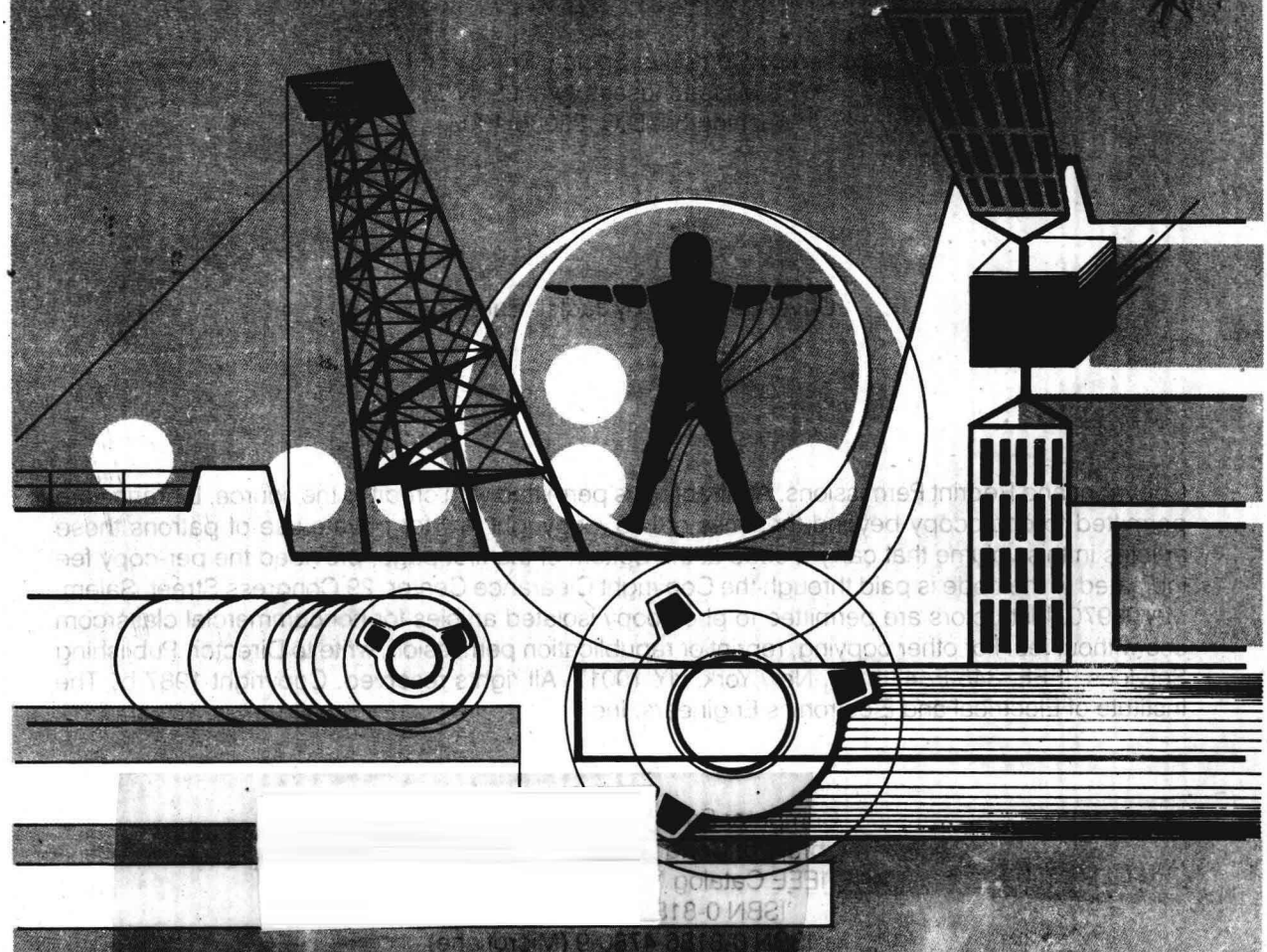
COMPUTERS AND APPLICATIONS

Beijing (Peking), Peoples' Republic of China

June 23-27, 1987



Computer Society Order Number 760
Library of Congress Number 87-80478
IEEE Catalog Number 87CH2433-1
ISBN 0-8186-0760-7
SAN 264-620X

Co-Sponsored by

Chinese Computer Federation

The Computer Society of the IEEE

In cooperation With
The National Natural Science Foundation of China

THE COMPUTER SOCIETY OF THE IEEE

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

IEEE COMPUTER SOCIETY PRESS

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Published by Computer Society Press of the IEEE
1730 Massachusetts Avenue, N.W.
Washington, D.C. 20036-1903

Cover designed by Jack I. Ballestero

Computer Society Order Number 780
Library of Congress Number 87-80478
IEEE Catalog Number 87CH2433-1
ISBN 0-8186-0780-7 (Paper)
ISBN 0-8186-4780-9 (Microfiche)
ISBN 0-8186-8780-0 (Case)
SAN 264-620X

Order from: Computer Society of the IEEE
Post Office Box 80452
Worldway Postal Center
Los Angeles, CA 90080

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Computer Society of the IEEE
Avenue de la Tanche, 2
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Introduction

After the successful first joint International Conference on Computers and Applications in 1984, the leaders of the Chinese Computer Federation (previously a Society of the Chinese Institute of Electronics) and of the Computer Society of the IEEE decided to hold a second conference. It was decided to maintain the same broad scope and applications-oriented theme of the first conference. The topics covered are the result of the current interests of a wide spectrum of practicing computer professionals, rather than of any fixed prescription of the program committee. The main criterion for selection was the quality of the technical contribution. Of some 320 papers submitted from more than a dozen countries, less than half were finally accepted. Many good papers could not be accommodated in the short span of the three-day conference. We acknowledge the difficult work of the reviewers by listing their names in the following pages.

The papers included reflect timely subjects in modern computing:

- Networks and Distributed Processing;
- Artificial Intelligence, Image Processing, and Pattern Recognition;
- Database, Algorithms, and Data Structures;
- Systems, Software, Tools, Applications, and Office Automation;
- Testing, Fault-Tolerance, and Reliability;
- VLSI, Computer, and Subsystem Design;
- Computer-Aided Engineering and Computer Graphics; and
- Parallel Processing and Performance Evaluation.

In addition, four tutorial sessions offered before and after the conference enhance the value of participating in this event.

The Cochairmen of the Program Committee want to sincerely thank the committee members and the reviewers for their prompt and thorough work. In particular, the untimely death of Dr. Taylor Booth, is recognized with sadness. Dr. Booth, a Program Committee member, contributed significantly to this and to the previous conference.

Finally, we express our appreciation to the General Conference Cochairmen for their assistance, to the leaders and staff of the two sponsoring organizations for their support, and to the National Natural Science Foundation of China for its collaboration.

We look forward to a technically and culturally enlightening experience in Beijing as an example of international cooperation and friendship.

Oscar N. GARCIA
ZHANG Xiaoxiang

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JDCS: A HETEROGENEOUS DISTRIBUTED COMPUTER SYSTEM BASED ON CAMBRIDGE RING

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Abstract

A heterogeneous personal microcomputer distributed system developed at the University of Jilin during the period of 1983-1986 is described in this paper. The system is based on a Cambridge Ring which we ourselves built. The Ring contains 10 nodes connecting 13 computers of 9 models and is 1100-metre long (3 slots runnable) using twisted cables with error rates of 10^{-11}. The system is a typical client/server distributed system, providing services of file, name, print/spooling, asynchronous communication, error logger, boot, plot, mail, UNIX and mainframe.

Introduction

Since July 1983 we have started a project -- developing the Jilin Distributed Computer System (JDCS), a heterogeneous personal microcomputer distributed computing system using a Cambridge Ring. The objectives of the project are:

a) building a Cambridge Ring by ourselves, obtaining detailed, hand-on experience with it, designing suitable access boxes to allow more types of computer in China to be attached to the Ring.

b) to seek a method of setting up a DCS promoting applications of microcomputers in China.

c) to set up a working distributed system, stimulating atmosphere for pursuing research.

It should be noted that in China most computers are low cost personal microcomputers, and quite different from each other. These need to be connected together via a Ring for application such as office automation and the access boxes must be cheap and simple.

The remainder of this paper presents the status of the Ring built at Jilin, architecture, functions and implementation of the JDCS. The reader is referred to the references for great detail of designing and implementation of the Cambridge Ring[1] and general principles of distributed computing system based on the Cambridge Ring.[4,5,6]

The Ring of Jilin

The Ring of Jilin built at the University of Jilin is based on information offered by the University of Cambridge Computing Laboratory. The Ring system is shown in figure 1.

The present status of the system is as following:

repeaters	10
monitor	1
station units	10
access boxes interrogating type	7
access boxes interrupting type	3
ring size in length(metres)	1100
slots runnable	3
maximum distance between repeaters (in metres)	150
data rate (MBPS)	10
error rates	10^{-11}
protocols	BBP, SSP[2,3]

At the time of writing 13 computers of 9 models have been connected to the Ring. Configurations of the computers are shown in table 1.

The Ring system has three features:

a) It is a heterogeneous system.
b) It has three types of connecting computers to the Ring (interrogating, interrupting and using asynchronous lines) .
c) It has three kind of nodes:
   .server nodes:
      only providing some services to client nodes or other server nodes.
   .client nodes:
      do not provide any services, only access server nodes.
   .server/client nodes:
      have both server and client roles.

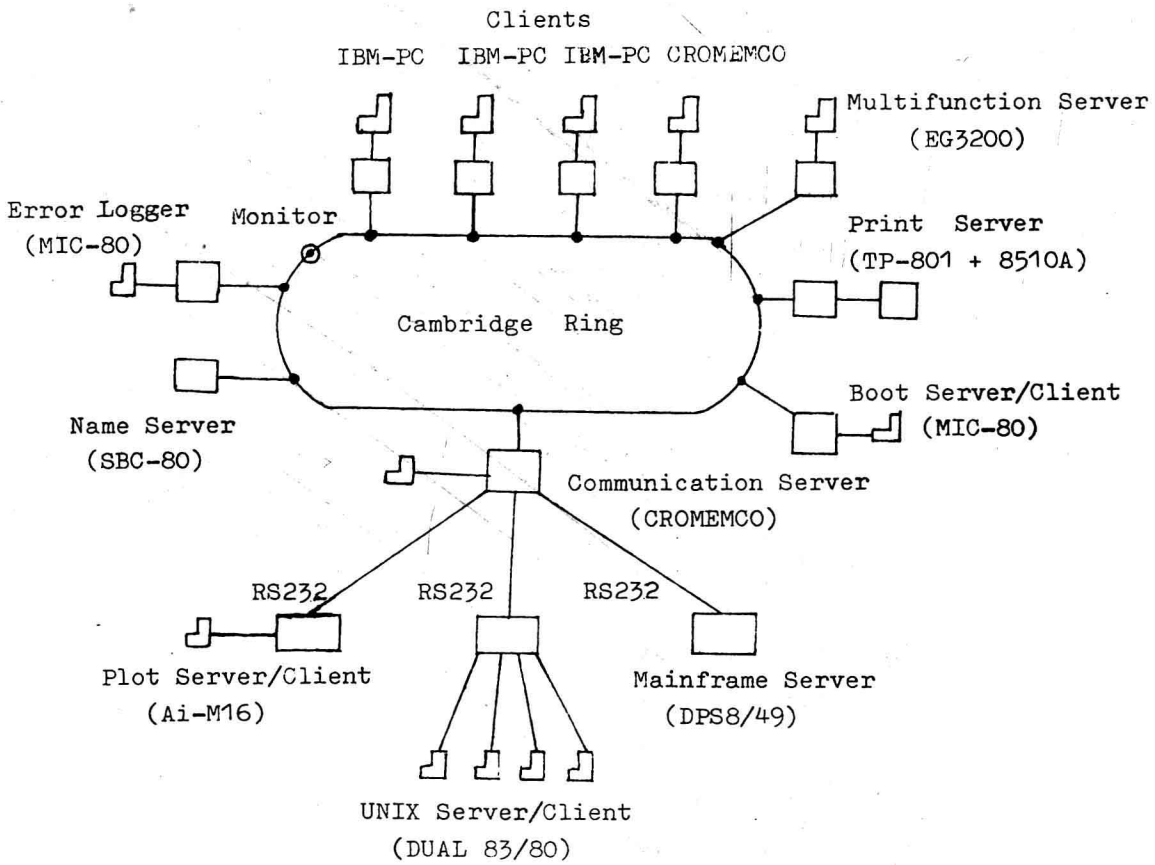

Figure 1. Functional diagram of JDCS

Functions of JDCS

The system may provide many services, such as:

.File service: A user at a client node may access the file system of the File Server. Operation includes renaming, fetching, sending, deleting a file and reading the directory of the file system.

.Print service: A local file or a file on the File Server may be sent to the Print Server for printing out immediately, or queuing up (spooling).

.Asynchronous Communication service: The multicommunication controller connects computers with RS232 asynchronous serial lines to the Ring.

.Mail service: Users who have been signed with appropriate passwords given by the operator of the system may send or read letters each other at any client nodes. Chinese characters may be used on IBM-PCs.

.Time service: A user may read the year, month, day, date, hour, minute from the Time Server at any client nodes. The Mail Server reads the time from the Time Server when writing a letter and appends it to the letter. The Error Logger reads the time from the Time Server when receiving an error report and writes it down to the error record.

.UNIX service: A user at an IBM-PC or a CROMEMCO computer may use the facilities on Dual 83/80 computer. Most of the UNIX utilities are available.

.Mainframe service: Users on the Ring may use a client node computer as a remote terminal of the mainframe computer Honeywell DPS8/49, being located in the Computing Centre of the University.

.Plot service: Users of client node computers may use the Plotter, graphic terminal or graphic printer of the Ai-M16 computer.

.Name service: The Name Server maps names of servers, computers and processes to physical addresses and vice versa, making resources of the system transparent to the users.

.Boot service: Low cost micros without floppy discs such as TP-801 and SBC-80 single boards computer are loaded by tape recorders usually and not convenient, impossible in some cases. When such a computer on the Ring requests the Boot