TABLE OF CONTENTS

Preface v
Conference Chairman's Letter vi
Sponsoring and Supporting Organizations vii
Conference, Organizing and Reviewing Committees viii

INVITED PAPERS

Extending the Power of Programming by Examples
G. Attardi and M. Simi 3

A Query—the—User Facility for Logic Programming
M. Sergot 27

EXPERIENCES WITH KNOWLEDGE BASED SYSTEMS

Designing Interactive Systems from the User's Viewpoint
H. Lieberman 45

Knowledge Representation Tools for the Design, Training and Use of Information Systems
C.L. Sidner and J.J. Vittal 61

G. Fischer and H.D. Böcker 73

SOFTWARE AND HARDWARE ARCHITECTURES

A VLISP Implementation of SMALLTALK-76
P. Cointe 89

A Garbage Collecting Associative Memory for Interactive Database Systems
R.A. Ross 103

A Hardware Support for Interactive Programming Environments
J.P. Sansonnet, C. Percebois, D. Botella and J. Perez 125
## Table of Contents

### SCREEN-ORIENTED SOFTWARE TECHNOLOGIES

**Two-Dimensional Syntax for Functional Languages**  
L. Cardelli  
139

**An Interactive System for Editing Mathematical Documents**  
V. Quint  
153

**Towards a Two-Dimensional Programming Environment**  
B. Meyer  
167

### SOFTWARE DESIGN PRINCIPLES

**An Abstract PROLOG Machine**  
H.J. Komorowski  
183

**ORBIT: An Applicative View of Object-Oriented Programming**  
L. Steels  
193

**Syntax-Directed Program Modularization**  
B.B. Kristensen, O.L. Madsen, B. Møller-Pedersen and K. Nygaard  
207

### PROGRAMMING ENVIRONMENTS

**An Interactive Approach to Software Specification**  
S.W. Smoliar  
223

**An Integrated, Interactive and Incremental Programming Environment for the Development of Complex Systems**  
H. Wertz  
235

**Experiences with Building a Software Framework for Interactive Systems**  
D.T. Barnard, I.A. MacLeod and B. Stratton  
251
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL LANGUAGE INTERFACES</td>
<td>A Case Study of a Method for Determining the Necessary Characteristics of a Natural Language Interface</td>
<td>K. Bates and C.L. Sidner</td>
<td>263</td>
</tr>
<tr>
<td></td>
<td>A Two-Way Natural Language Interface</td>
<td>B. Katz and P.H. Winston</td>
<td>279</td>
</tr>
<tr>
<td>DESIGN OF USER-FRIENDLY SYSTEMS</td>
<td>Designing the STAR User Interface</td>
<td>D.C. Smith, C. Irby, R. Kimball, B. Verplank and E. Harslem</td>
<td>297</td>
</tr>
<tr>
<td></td>
<td>OFFICETALK-ZERO: An Experimental Integrated Office System</td>
<td>W.N. Newman and T. Mott</td>
<td>315</td>
</tr>
<tr>
<td></td>
<td>The Design of User-Friendly Systems for Generating Intelligent Dialogues</td>
<td>N. Bevan</td>
<td>333</td>
</tr>
<tr>
<td>EXTENSIONS TO THE UNIX PROGRAMMING ENVIRONMENTS</td>
<td>RCS: A Revision Control System</td>
<td>W.F. Tichy</td>
<td>345</td>
</tr>
<tr>
<td></td>
<td>Toward a Formally Based Programming Environment</td>
<td>A. Giacalone, T.W. Doeppner and M.J. Braca</td>
<td>363</td>
</tr>
</tbody>
</table>