CONTENTS:

INTRODUCTION

For over four decades, IBM researchers have been in the forefront of innovation in most of the recognized disciplines of computer science as well as the related disciplines of electrical engineering and mathematical sciences. These scientists have made pioneering contributions in high-speed processor design, computer architecture, programming languages, optimizing compilers, operating systems, storage systems, computer-supported cooperative work, databases, speech recognition, integer programming, service-oriented architectures, and more. In recognition of their contributions, researchers have earned numerous prestigious honors, including five ACM Turing Awards: John Backus for FORTRAN, Ken Iverson for APL, E.F. (Ted) Codd for relational databases, John Cocke for RISC, and Jim Gray for database and transaction processing. In addition, IBM researchers have helped shape such new areas as electronic commerce, autonomic computing, and services computing.

While the research teams work closely with IBM's product and services divisions, as well as with clients, to create novel technologies and solutions, they also actively patent their inventions and contribute to standards bodies and open source software. In addition, they publish prolifically, participate in conferences and professional societies, and collaborate with universities and government agencies to initiate and pursue new research directions. For example, IBM Research is working with universities, industry leaders, and government representatives to establish a broad new cross-disciplinary academic program in Services Sciences, Management and Engineering.

IBM Research's diverse population, with its expertise, access to clients, and partnerships with the rest of IBM, provides a stimulating environment that positions its researchers to pursue innovation that matters to IBM, to science and technology, and to the IT industry.

This brochure provides a glimpse of the wide scope of IBM's research in computer science, electrical engineering, and mathematical sciences. It highlights past contributions and current activities, and describes future objectives. Each section is devoted to a research discipline or a few closely related disciplines. The content has been provided by IBM Research's Professional Interest Communities (PICs). These communities, modeled on external technical/professional societies such as ACM Special Interest Groups and IEEE Technical Societies, span Research's worldwide labs. The brochure is organized into three main areas: Foundations, Systems, and Software and Services.

FOUNDATIONS
encompasses core disciplines, including most of our mathematical sciences research: artificial intelligence, operations research and theory of computing, performance modeling and analysis, security and privacy, as well as signal processing and multimedia.

SYSTEMS
covers most of our electrical engineering research, with sections on computer architecture and supercomputing, operating systems and storage systems, and advanced processor design which includes VLSI design, design automation, verification technology, and packaging.

SOFTWARE AND SERVICES
includes most of our computer science research, with sections on autonomic computing, communications and networking, computational biology and medical informatics, data management, distributed computing, graphics and visualization, human-computer interaction and user interface technologies, mobile computing, natural language processing, programming languages and software engineering, services computing, statistics and data mining, as well as Web.

ACKNOWLEDGEMENTS

Managing Editors
Stuart I. Feldman
Arcadia Kocybala
Stephen S. Lavenberg
Chung-Sheng Li
Craig B. Stunkel
Lewis M. Terman

Editor
Paridhi S. Verma

Art Director
Tiia T. Sahni

Consultant
Jennifer Vickery

IBM's first research facility, the Watson Scientific Computing Laboratory, opened in New York City at Columbia University in 1945. Today, IBM Research has over 3,000 employees at eight laboratories in China, India, Israel, Japan, Switzerland, and the United States. For more information on IBM Research worldwide locations, visit http://www.research.ibm.com/worldwide.

As IBM's products and services address virtually all aspects of information technology, the technical and scientific activities in IBM Research are equally broad. Researchers work in a wide range of fields, including: chemistry, computer science, electrical engineering, materials science, mathematical sciences, and physics.

FOUNDATIONS