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INFRASTRUCTURE FOR ELECTRONIC BUSINESS ON THE INTERNET

by

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Foreword

Design is an art form in which the designer selects from a myriad of alternatives to bring an “optimum” choice to a user. In many complex systems the notion of “optimum” is difficult to define. Indeed, the users themselves will not agree, so the “best” system is simply the one in which the designer and the user have a congruent viewpoint. Compounding the design problem are tradeoffs that span a variety of technologies and user requirements. The electronic business system is a classically complex system whose tradeoff criteria and user views are constantly changing with rapidly developing underlying technology.

Professor Milutinovic has chosen this area for his capstone contribution to the computer systems design. This book completes his trilogy on design issue in computer systems. His first work, “Surviving the Design of a 200 MHz RISC Microprocessor” (1997) focused on the tradeoffs and design issues within a processor. His second work, “Surviving the Design of Microprocessor and Multiprocessor Systems” (2000) considers the design issues involved with assembling a number of processors into a coherent system. Finally, this book generalizes the system design problem to electronic commerce on the Internet, a global system of immense consequence.

In approaching this broad and forward looking system problem, Professor Milutinovic has carefully chosen the level of detail so that the design issues are at once both understandable and accessible. His discussion of software tools and software agents is both insightful and understandable.

His Internet technology discussion is quite important, as it may be one of the first accessible presentations of the design issues in this emerging technology.

A special feature of his book is the extensive appendixes, which provide a catalog of case studies into some of the leading implementations in e commerce.

Through this book Professor Milutinovic provides a forum in which both designers and users can better understand the available technologies and, perhaps more important, understand the objectives in realizing complex e commerce systems. The notion of the “optimum” system is ephemeral; it can only be realized when the designer’s and user’s viewpoints have a consistent set of objectives and frame of reference. In so far as this book provides that reference, it provides an important contribution to the computer systems field.

MICHAEL J FLYNN

MARCH 11, 2001

Preface

The field of electronic business on Internet (EBI) is rapidly growing. It includes a number of subfields like electronic commerce, electronic multimedia, workflow technologies, collaboration technologies, etc. The term electronic business on Internet implies a synergistic interaction between a number of different fields (all subfields mentioned above and much more), with the purpose of maximizing not only the short term profit, but the long-term profit, as well.

In order to establish technical prerequisites for efficient electronic business on Internet, appropriate system support is needed. That system support and its main bottlenecks are the major subject of this book. The stress is on explanations that link the newly emerging problems with those found in the general computer architecture field.

As already indicated, the goal of this book is to cover the main bottlenecks and naturally, the first question to ask is what are the main bottlenecks. In order to answer such a question, researchers from the leading industry in the field were consulted, and the table of contents of this book reflects their views.

Attention is dedicated both to hardware and software issues, and their symbiotic interaction. Also, as already indicated, some of the problems in this newly emerging field are analogous to the problems in the general computer architecture field, and could be modeled and solved in similar ways, with the precaution which is normal in such circumstances. Consequently, some basic knowledge of general computer architecture is potentially helpful when reading this book.

The basic assumption of this book is that the recognized bottlenecks will continue to be present during the decade to follow. In such circumstances, as the time goes by, the basic structure of the book will remain to be actual, and teachers using the book will just have to add fresh examples, in the form of handouts that supplement each specific chapter.

One special value of the book are its appendices. Some appendices are internal and can be found at the end of the book. Others are external, and can be found at the WWW site which supplements the book (<http://www.etf.bg.ac.yu/~ebi/>). External appendices cover the student work, which includes software packages, survey papers, research papers, and application nodes.

Presented appendices (both internal and external) are of special value to those interested not only in theoretical but also in practical aspects of the problem. All appendices are the result of industrial cooperation between the author and his associates on one side, and industry worldwide (USA, Europe, and Far East) on the other side.

The book is organized into eleven different sections: (a) Introduction, (b) Software tools for EBI, (c) ADSL, (d) Internet automation, (e) Software agents, (f) Proxy caching, (g) Workflow technologies, (h) Collaboration technologies, (i) An overview of the on-going research, (j) Conclusion, and (k) References. Each section includes several problems, which can be treated as homework assignments.

The distinction between sections is not a clear cut, since many subjects are of the interdisciplinary nature, and can belong to more than one section. Also, section names refer only to the basic subject, although they include the related subjects, as well.

Different subjects are given different amount of space, which reflects the importance of the subject, from the point of view of this book.

Presentation methodology of this book stresses the importance of the pictorial approach to the educational mission of passing the information. Consequently, the number of figures is relatively large. Often times, in order to stress a fact, the fact is repeated in the form of a picture which only underlines the same fact using bigger letters, so the reader can memorize better.

Also, an effort is made that figure captions include not only the title and legend of the figure, but also a sentence or two on the essential

contribution of the figure. It is suggested that, at the first scanning of the book, one views and reads only figures and figure captions.

This book is well suited for graduate and advanced undergraduate students, and has been used at numerous universities worldwide, to support graduate and undergraduate teaching (Salerno and Pisa in Italy, Valencia and Barcelona in Spain, Belgrade and Podgorica in Yugoslavia, etc.).

In addition, this book served the basis for a number of invited university talks, specialized courses, and preconference tutorials. Invitations include, but are not limited to, Maui, Palms Springs, Gran Bahamas, Mexico, Florence, L'Aquila, Warsaw, Kazimierz Dolny, Innsbruck, Eindhoven, Beograd, Novi Sad, Herceg Novi, Budva, Kopaonik, Vrnjacka Banja, etc.

Finally, this book is also well suited for practitioners from industry (for innovation of their knowledge) and for managers in industry (for better understanding of future trends). So far, this book was also used to support industrial research in the field of system support for electronic business on Internet (eT Communications and Virtual Computer Corporation in the USA, C-MAP and CRMPA in Italy, Tellco and Tehnicom in Yugoslavia, etc.).

Those who have suggestions on how to improve the text in the follow-up editions of this book are kindly requested to contact the author. The best method for this purpose is to use electronic mail. The author will be extremely thankful to all those who contribute with productive criticism.

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I am sure, some names have been omitted. If you notice one, please let the author know, and the error will be fixed.

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