Preface

Quality of Service (QoS) is gaining importance in the global market and, as such, is affecting all available products. While, at first, merely the quality of material was important, with "high-tech" products QoS encompasses an integral measure of efficiency, economy and ease of use. Since production processes largely affect the quality of products, interest now focuses on computerised control systems for which a number of quality criteria must be observed during their real-time operation. Hence, we would like to measure the QoS of real-time computing systems in order to determine their suitability for certain control applications and the systems being controlled. We would also like to compare such computing systems with one another. Finally, we would like to certify systems fulfilling QoS requirements with corresponding quality marks.

So far, QoS measures for real-time systems have not received much attention, and the quality of real-time systems has been evaluated differently in different application areas mainly on an ad hoc basis. An assessment of some existing QoS measures for real-time systems will reveal that they are predominantly inappropriate. Taking a closer look at the fundamental issues of real-time systems, it will become clear that for (hard) real-time systems qualitative characteristics are much more important than quantitative metrics. The major qualitative performance measures are compiled in this book. Systems fulfilling the QoS criteria may finally be compared on the basis of costs.

In this book, the state of the art in QoS evaluation of real-time systems shall be reviewed. It will turn out that for their proper assessment a more thorough consideration of the nature of real-time systems is necessary. This will finally lead to a number of QoS criteria. Surprising to those who used to confuse real-time with fast computing, most of these criteria are not concerned with system performance, but are rather qualitatively comparative and exclusive, i.e. a system may either fulfil them or not. Based on these criteria the critical points in the design and development process of real-time systems, where these criteria should be applied or checked and how, are determined. As a conclusion, software development and certification standards are assessed, and a proposition with guidelines on how the presented criteria should be

applied in the design, development and certification process of real-time computing systems is laid out.

Maribor and Hagen,
June 2009

Roman Gumzej
Wolfgang A. Halang

Real-time Systems' Quality of Service
Introducing Quality of Service Considerations in the Life
Cycle of Real-time Systems
Gumzej, R.