# Chapter 1 Introduction

In this chapter, we briefly review the origin of Petri nets, past conferences on Petri nets and the application areas considered in the literature. Then, we present the only rule one has to learn about Petri net theory, the rule of transition enabling and firing. Although this rule appears very simple, its implications in Petri net theory are very deep and complex.

## 1.1 Overview

Petri nets provide a graphical and mathematical modeling tool applicable to many systems. They are a promising tool for describing and studying information processing systems that are characterized as being concurrent, asynchronous, distributed, parallel, nondeterministic, and/or stochastic. As a graphical tool, Petri nets can be used as a visual-communication aid similar to flow charts, block diagrams and networks. In addition, tokens are used in these nets to simulate the dynamic and concurrent activities of systems. As a mathematical tool, it is possible to set up state equations, algebraic equations, and other mathematical models governing the behavior of systems. A unique feature of Petri nets is that they have a so-called "three-in-one" capability. That is, a Petri net model can be used simultaneously as 1) a graphical representation, 2) mathematical description, and 3) simulation tool for the system under study. Thus, Petri nets can be used by both practitioners and theoreticians, and provide a powerful medium of communication between them. That is, practitioners can learn from theoreticians how to make their models more methodical, and theoreticians can learn from practitioners how to make their models more realistic.

Historically speaking, the concept of the Petri net has its origin in Carl Adam Petri's dissertation [1] submitted in 1962 to the faculty of Mathematics and Physics at the Technical University of Darmstadt, Germany. The dissertation was prepared while C. A.