Abstract

Concurrent systems are very complex and error-prone because these systems are associated with significant issues, such as deadlock, starvation, communication, non-deterministic behavior and synchronization. Using formal methods, which are based on mathematical notions and theories, can help to increase confidence in these systems. Thus in recent years, most efforts have focused to specify, verify and develop concurrent systems formally. However, with specifications that have been done up to this time, several important aspects of concurrent systems, such as dynamic process creation, scheduling, starvation and infinite execution have not been specified formally yet. On the other hand, some specified aspects, such as deadlock, synchronization and communication have not been described as completely and accurately and/or have been specified using a combination of several different methods and formalisms so that the integration of existing specifications needs too much effort. It can be said unequivocally that until now there is no specification framework, based on a single formalism, for concurrent systems in which all important aspects of these systems are considered. Thus, our previous work tried to present an integrated formal specification framework of all the extracted aspects based on just one formal notation, i.e., the Z language. In this paper, the details of the mentioned formal framework are first presented. Then, this framework is evaluated from two viewpoints: comprehensiveness of the framework itself and appropriateness of Z to write an
integrated formal specification of concurrent systems.

References

- X. He, "PZ nets: a formal method integrating petrinets with Z", Elsevier

**Index Terms**

Computer Science  Information Sciences

**Keywords**

Concurrent systems  Formal methods  Formal specification  Z language