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Asynchronous Programming in the Abstract Behavioural Specification Language

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Part II

Case Study:

Preferential Attachment in ABS

This part consists of the following chapters:

Chapter 2 The Barabasi-Albert model (BA) is designed to generate scale-free networks using the preferential attachment mechanism. In the preferential attachment (PA) model, new nodes are sequentially introduced to the network and they attach preferentially to existing nodes. PA is a classical model with a natural intuition, great explanatory power and interesting mathematical properties. Therefore, PA is widely-used for network generation. However the sequential mechanism used in the PA model makes it an inefficient algorithm. The existing parallel approaches, on the other hand, suffer from either changing the original model or explicit complex low-level synchronization mechanisms. In this chapter we investigate a high-level Actor-based model of the parallel algorithm of network generation and its scalable multi-core implementation in the ABS language.

Chapter 3 Generation of social networks using Preferential Attachment (PA) mechanism introduced in previous chapter features interesting mathematical properties which only appear in large-scale networks. However generation of such extra-large networks can be challenging due to memory limitations. In this chapter, we investigate a distributed-memory approach for PA-based network generation which is scalable and which avoids low-level synchronization mechanisms thanks to utilizing the powerful programming model and proper programming constructs of the ABS language.