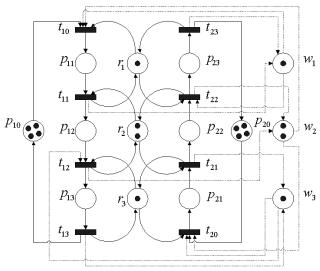
Discrete Event Dynamic Systems 2
Chairs: M. A. Jafari, Okyay Kaynak

Structural approaches to deadlock avoidance in concurrent resource allocation systems

Jonghun Park and Spyros Reveliotis
Georgia Institute of Technology

- Development of an ANALYTICAL / ALGEBRAIC criterion for testing the correctness of tentative algebraic deadlock avoidance policies (DAP's) for Single-Unit Sequential Resource Allocation Systems (SU-RAS)
- The behavior of SU-RAS controlled by algebraic DAP's is modeled by a PN class in which liveness is equivalent to the non-existence of reachable empty siphons. But the latter property can be tested algebraically.
- The included example demonstrates that the proposed methodology can effectively expand the class of algebraic DAP's for SU-RAS.
- The proposed work has expanded the class of effectively computable algebraic DAP's for SU-RAS, potentially enhancing the operational flexibility of these systems. Future work will extend these results to broader RAS classes.



Resource-oriented petri nets for deadlock avoidance in automated manufacturing

Naiqi Wu[1] and Mengchu Zhou[2]
[1]Guangdong University of Technology and [2]New Jersey Institute of Technology

- Introduction
- Petri nets and system modeling
- Liveness of interactive subnets
- Performance improvement through an example

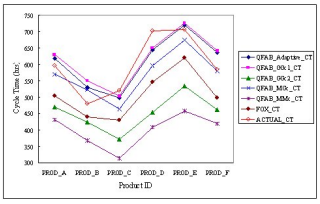
Deadlock avoidance for manufacturing systems with partially ordered process plans

Widodo Sulistyono and Mark A. Lawley
Purdue University

Queuing Network Analysis for an IC Foundry

J. Y. Juang and H. P. Huang
National Taiwan University

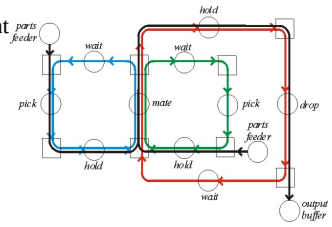
- A tool-group based hybrid decomposed queueing network model
- System diagnosis: arrival and service pattern analysis
- System prediction: product cycle time, lot remaining cycle time, N-step cycle time, tool group move, stage move, tool group utilization
- Successfully applied to a famous IC foundry



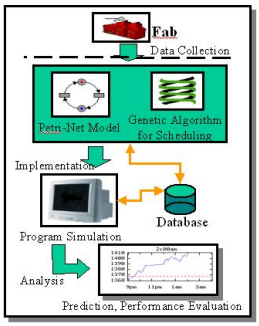
A Formalism for the Composition of Concurrent Robot Behaviors

Eric Klavins and D. E. Koditschek
University of Michigan

- Synthesis of Hybrid, Concurrent Robot Behaviors
- Applications in Automated Manufacturing
- Compositional Petri Nets are Live and Reversible



Petri-Net and GA Based Approach to Modeling, Scheduling, and Performance Evaluation for Wafer Fabrication

J. H. Chen and L. C. Fu
National Taiwan University

- Provide an effective scheduling method for wafer fabrication.
- Use Petri-Net for modeling tools & GA for scheduling approach.
- Two cases of simulations to show the superiority of this method.
- Present a systematic modeling method & an effective scheduling policy.