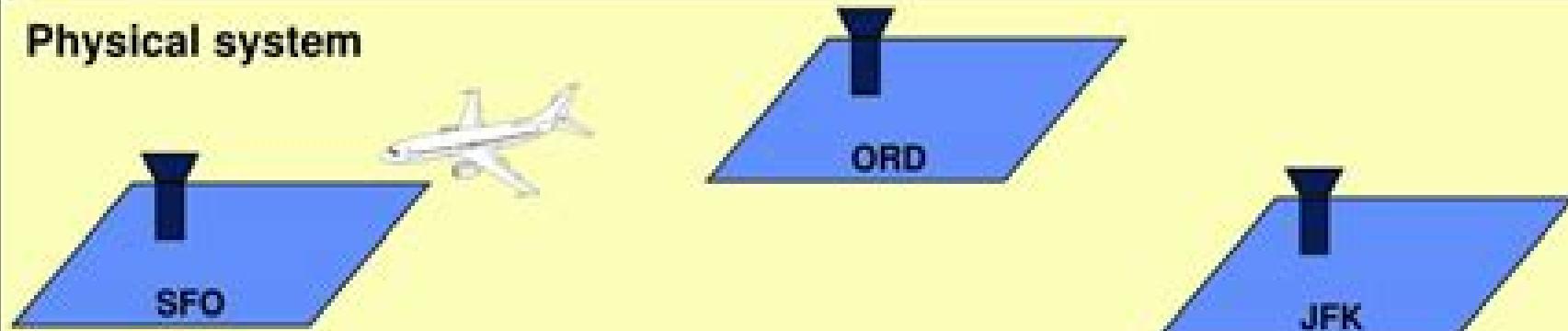


# Parallel Discrete Event Simulation Example

## Physical system



physical process



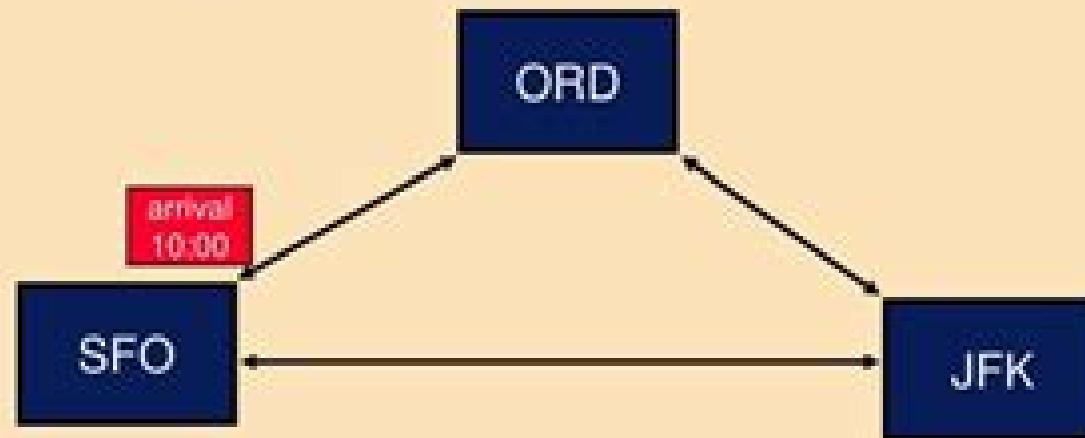
logical process

interactions among physical processes



time stamped event (message)

## Simulation



all interactions between LPs must be via messages (no shared state)

# Parallel And Distributed Discrete Event Simulation

**Donald O. Hamnes, Anand  
Tripathi, Army High Performance  
Computing Research Center, University  
of Minnesota**

## Parallel And Distributed Discrete Event Simulation:

**Parallel and Distributed Discrete Event Simulation** Carl Tropper,2002 Discrete event simulation has long been an integral part of the design process of complex engineering systems and the modelling of natural phenomena Many of the systems that we seek to understand or control can be modelled as digital systems In a digital model we view the system at discrete instants of time in effect taking snapshots of the system at these instants For example in a computer network simulation an event can be the sending of a message from one node to another node while in a VLSI logic simulation the arrival of a signal at a gate may be viewed as an event Digital systems such as computer systems are naturally susceptible to this approach However a variety of other systems may also be modelled this way These include transportation systems such as air traffic control systems epidemiological models such as the spreading of a virus and military war gaming models This book is representative of the advances in this field

Special Issue on Parallel and Distributed Discrete Event Simulation - an Emerging Technology ,2002

**Parallel and Distributed Simulation Systems** Richard M. Fujimoto,2000-01-03 From the preface page xv My goal in writing Parallel and Distributed Simulation Systems is to give an in depth treatment of technical issues concerning the execution of discrete event simulation programs on computing platforms composed of many processores interconnected through a network

**Parallel and Distributed Discrete-event Simulation** Ghulam M. Bhatti,1998

**Conservative Parallel and Distributed Discrete Event Simulation Using Java** Ahmad Ramadani,2006

Special Issue on Parallel Discrete Event Simulation ,1993

*Parallel and Distributed Simulation of Discrete Event Systems* Alois Ferscha,Satish K. Tripathi,1994 Abstract The achievements attained in accelerating the simulation of the dynamics of complex discrete event systems using parallel or distributed multiprocessing environments are comprehensively presented While parallel discrete event simulation DES governs the evolution of the system over simulated time in an iterative SIMD way distributed DES tries to spatially decompose the event structure underlying the system and executes event occurrences in spatial subregions by logical processes LPs usually assigned to different physical processing elements Synchronization protocols are necessary in this approach to avoid timing inconsistencies and to guarantee the preservation of event causalities across LPs Included in the survey are discussions on the sources and levels of parallelism synchronous vs asynchronous simulation and principles of LP simulation In the context of conservative LP simulation Chandy Misra Bryant deadlock avoidance and deadlock detection recovery strategies Conservative Time Windows and the Carrier Nullmessage protocol are presented Related to optimistic LP simulation Time Warp Optimistic Time Windows memory management GVT computation probabilistic optimism control and adaptive schemes are investigated

**Automatic Algorithm Selection for Complex Simulation Problems** Roland Ewald,2011-11-20 To select the most suitable simulation algorithm for a given task is often difficult This is due to intricate interactions between model features implementation details and runtime environment which may strongly affect the overall performance An automated selection of simulation algorithms supports users in setting

up simulation experiments without demanding expert knowledge on simulation Roland Ewald analyzes and discusses existing approaches to solve the algorithm selection problem in the context of simulation He introduces a framework for automatic simulation algorithm selection and describes its integration into the open source modelling and simulation framework James II Its selection mechanisms are able to cope with three situations no prior knowledge is available the impact of problem features on simulator performance is unknown and a relationship between problem features and algorithm performance can be established empirically The author concludes with an experimental evaluation of the developed methods Parallel Distributed Discrete Event Simulation Optimization Using Complexity and Deep Learning Edwin A. Cortés,2015 Parallel distributed discrete event simulation PDDES is the execution of a discrete event simulation on a tightly or loosely coupled computer system with multiple processors The discrete event simulation model is decomposed into several logical processors LPs or simulation objects that can be executed concurrently using partitioning types such as spatial and temporal PDDES is exceedingly important for the reduction of the simulation time increase of model size intellectual property issue mitigation in multi enterprise simulations and the sharing of resources One of the problems with PDDES is the time management to provide flow control over event processing the process flow and the coordination of different logical processors to take advantage of parallelism Time Warp TW Breathing Time Buckets BTB and Breathing Time Warp BTW are three time management schemes studied by this research For a particular PDDES problem unfortunately there is no clear methodology to decide a priori a time management scheme to achieve higher system and simulation performance This dissertation shows a new approach for selecting the optimal time synchronization technique class that corresponds to a particular parallel distributed and discrete simulation with different levels of simulation logic complexity Simulation complexities such as branching parallelism function calls concurrency iterations mathematical computations messaging frequency event processing and number of simulation objects interactions were given a weighted parameter value based on the cognitive weight approach Deep belief neural networks were then used to perform deep learning from the simulation complexity parameters and their corresponding optimal time synchronization scheme value as measured by speedup performance

**Theory, Methodology, Tools and Applications for Modeling and Simulation of Complex Systems** Lin Zhang,Xiao Song,Yunjie Wu,2016-09-22 This four volume set CCIS 643 644 645 646 constitutes the refereed proceedings of the 16th Asia Simulation Conference and the First Autumn Simulation Multi Conference AsiaSim SCS AutumnSim 2016 held in Beijing China in October 2016 The 265 revised full papers presented were carefully reviewed and selected from 651 submissions The papers in this first volume of the set are organized in topical sections on modeling and simulation theory and methodology model engineering for system of systems high performance computing and simulation modeling and simulation for smart city

**The Programmer** Michael Di Loreto,2025-01-06 This is the true story of an ordinary Programmer who did extraordinary things His career as a professional Computer Programmer began in 1968 and ended in 2017 Without any formal education he

was self taught and very successful That is he had good jobs and made good money not that he got rich or famous A hard core Programmer for 49 years he never went into management or did anything else Having had every title from Systems Analyst to Software Engineer he still insists on the old fashioned Programmer to describe his work In addition to recounting his job experiences he gives lessons in programming These lessons are not so much about technology as about the attitudes and behaviors that make a successful problem solver He addresses himself to other Programmers but it s not too technical for general readers He also talks about his long time hobby of studying foreign languages and linguistics There s a little but not much about his personal life but his life corresponds with the modern history of computers and programming He was born in 1950 about the same time as the introduction of the first commercially available digital computer UNIVAC I He got his first job as a Programmer in 1968 programming a third generation computer the UNIVAC 9300      **PADS 2003** George F.. Riley,Philip A.. Wilsey,2003      *Distributed Discrete Event Simulation. Final Report* ,1988 The presentation given here is restricted to discrete event simulation The complexity of and time required for many present and potential discrete simulations exceeds the reasonable capacity of most present serial computers The desire then is to implement the simulations on a parallel machine However certain problems arise in an effort to program the simulation on a parallel machine In one category of methods deadlock care arise and some method is required to either detect deadlock and recover from it or to avoid deadlock through information passing In the second category of methods potentially incorrect simulations are allowed to proceed If the situation is later determined to be incorrect recovery from the error must be initiated In either case computation and information passing are required which would not be required in a serial implementation The net effect is that the parallel simulation may not be much better than a serial simulation In an effort to determine alternate approaches important papers in the area were reviewed As a part of that review process each of the papers was summarized The summary of each paper is presented in this report in the hopes that those doing future work in the area will be able to gain insight that might not otherwise be available and to aid in deciding which papers would be most beneficial to pursue in more detail The papers are broken down into categories and then by author Conclusions reached after examining the papers and other material such as direct talks with an author are presented in the last section Also presented there are some ideas that surfaced late in the research effort These promise to be of some benefit in limiting information which must be passed between processes and in better understanding the structure of a distributed simulation Pursuit of these ideas seems appropriate      *Distributed Stochastic Discrete-event Simulation in Parallel Time Streams* Krzysztof Pawlikowski,Victor Yau,D. C. McNickle,University of Canterbury. Department of Computer Science,1993      Annual Review of Scalable Computing Yuen Chung Kwong,2000 This book provides a forum for researchers in scalable computing to publish extended length articles on significant new developments An article may present comprehensive results from a major project review recent work in a sub domain or expound new ideas in a detailed tutorial fashion at a length which most journals and

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*Encyclopedia of Microcomputers* Allen Kent,James G. Williams,1993-11-18 The Encyclopedia of Microcomputers serves as the ideal companion reference to the popular Encyclopedia of Computer Science and Technology Now in its 10th year of publication this timely reference work details the broad spectrum of microcomputer technology including microcomputer history explains and illustrates the use of microcomputers throughout academe business government and society in general and assesses the future impact of this rapidly changing technology     *Simulation and Modeling* Osman Balcı,1994     **ACM Transactions on Modeling and Computer Simulation** ,2000

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