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An Introduction to Distributed Simulation

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Abstract: Distributed simulation technologies were created to execute simulations on distributed computer systems (i.e., on multiple processors connected via communication networks) [1]. Distributed simulation is a computer program that models real or imagined systems over time. On the other hand, distributed computer systems interconnect various computers (e.g., personal computers) across a communication network. Therefore, distributed simulation deals with executing simulation correctly over interconnected multiple processors. Correctness means that the simulation should produce the same results as if it was executed sequentially using a single processor. Fujimoto distinguished parallel from distributed simulation by their physical existence, used processors, communication network, and latency [1]. Parallel systems usually exist in a machine room, employing homogeneous processors, and communication latency is measured with less than 100 ?s. In contrast, distributed computers can expand from a single building to global networks, often employing heterogeneous processors (and software), and communication latency is measured with hundreds of microseconds to seconds. The simulation is divided spatially (or temporally) and mapped to participating processors. Our focus here is on distributed simulation, which employs multiple distributed computers to execute the same simulation run over a wide geographic area.