

A Command Language to Rule Distributed Dynamic Systems

Dr. Peter Sapaty, Institute of Mathematical Machines & Systems, National Academic of Sciences, Kiev, Ukraine

Abstract

A new type of high level command and control language, oriented on coordination and management of dynamic distributed systems, will be revealed. It allows us to create, on the fly, complex mission scenarios, which can be executed by societies of both manned and unmanned units, with emergent subordination and job division between the two. Relieved from traditional communication, synchronization, and agent creation-interaction-movement routines, which are effectively shifted to automatic implementation in distributed environments, this World Processing Language (WPL) allows us concentrate on mission goals, integrity, and survivability instead. In WPL, elementary operations on information and matter, movement in physical or virtual spaces, parallel distributed control, hierarchical fusion of remote data and states, and creation of spatial infrastructures are of the same rank, resulting in integrity and simplicity of system solutions, which are often comparable to routine data processing in conventional languages. Implementation of the distributed WPL interpreter will be discussed, based on the existing prototypes, where spatial scenarios can start from any unit, dynamically grasping the system (or what remains from it, say, after a disaster) via the embedded network of interpreters. Programming examples, including useful combination of hierarchical control with distributed robotic swarming, and management of a disaster area will be exhibited.