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Architecture, analysis and design of the adaptive multi-agent intelligent system

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Modern distributed intelligent agent-based systems face the need to adapt to dynamic environmental conditions, which requires the development of flexible reconfigurable architectures, as well as methods for optimizing policy and agent interaction. The Adaptive Multi-Agent Intelligent System considered in this paper includes applied and system software agents that are capable of acting rationally and accumulating experience. The perception of the application software agents is realized using Multi-Agent Deep Reinforcement Learning techniques, and high-level reasoning using Cognitive Data Structures and logical inference. Applied software agents collaboratively solve complex users' tasks, system software agents manage distributed computing resources by interacting with the Operating System and microservices. The software modules associated with system software agents are part of the specialized library, which is less demanding on computing resources and provides better performance than universal system libraries. To improve performance and reliability, uses scaling, where agents and microservices are duplicated and run on different compute nodes, as well as load balancing and optimization of resource consumption during task execution, are used to improve performance and reliability.

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