

### **Analysis of a Large-Scale Multi-Agent System Simulation Framework**

Multi-Agent Systems (MASs) are valuable for the simulation and solving of decentralized problems. To manage their increasing complexity and to support large-scale simulations modern High Performance Computing (HPC) environments are in demand. To exploit massively parallel and distributed hardware new optimized tools are required and there exist already several approaches for MAS simulation frameworks that are evolved for HPC systems. This work analyzes the candidate Repast HPC and assays its usability in the context of large-scale simulations. A huge challenge is the efficient realization of communication between agents as well as between processes. Therefore, a majority of the thesis focuses on this aspect and provides a diverse insight into the synchronization mechanism of Repast HPC. To evaluate the framework several benchmarks are implemented, performed, and measurements are taken. The results show that Repast HPC is suitable for memory intense simulations and performs the synchronization of agent data between processes efficiently, especially for contiguous data.