

SPACE SYSTEMS SYMPOSIUM (D1)  
System Engineering Tools, Processes & Training (I) (3)

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AGENT BASED PROCESS MANAGEMENT TECHNOLOGY FOR COLLABORATIVE VIRTUAL  
TEST

**Abstract**

The virtual test is the key technology for the development of complex production such as launch vehicle and gets more emphasis in related industries and research departments. As the main method for the integration of the data and process involved in the development, the process management technology faces up to the challenges from the increasing complexity of product and the complicated context of virtual test. Especially, because the virtual test is related to multi-discipline, multi-department, multi-system and multi-domain which need to cooperate frequently and keep the relative independence from each other, how to efficiently manage the distributed and collaborative processes in different departments and domains is becoming the most important problem.

This paper introduces the MAS(multi-agent system) enhanced framework of process management for the distributed and cooperative processes in the virtual test based on the corresponding specification of workflow and Agent such as WfMC (Workflow Management Coalition) and FIPA(The Foundation for Intelligent Physical Agents) and discusses the related key technology of supporting platform. As the base of the framework, the hierarchical definition of three kinds of virtual test processes are put forward firstly, which include the holistic process, the subsystem inner process and the subsystem interface process. The holistic process is in charge of the transfer of information between subsystems, the subsystem inner process takes on the modeling and controlling of tasks in special process, while the subsystem interface process provides the bridge between them by dealing with the holistic information. Then, according to the hierarchical definitions and FIPA, the mappings from process to Agent framework are discussed, that is, the subsystem inner process is corresponding to the Agent platform and the special process to the Agent container. According to WfMC, the Agent partitions are pointed out in detail, which include TFDA(Test workFlow Definition Agent), TUA(Test User Agent), TFEA(Test workFlow Execution Agent), TFMA(Test workFlow Monitoring Agent), TFIA(Test workFlow Interaction Agent) and OA(Ontology Agent). These Agents are used in modeling and runtime of virtual test processes.

Furthermore, this paper discusses the key technologies in the framework in detail including Ontology definition and supporting platform designing. Thereinto, the Ontology definition is the base of Agent communication, which gives the dictionary of patterns and elements in process including the roles, routes and rules and gives the collaborative semantic elements such as ID of Agent platform and container. The supporting platform is divided into the workflow engine and the multi-agent system. In particular, the workflow engine adopts the block based workflow model according to the hierarchical definition of processes. And the multi-agent system takes JADE(Java Agent Development Framework) as the realizing framework which provides the Agent class and Behavior class to realize the management of Agents defined above. As the result of designing, the logic graph is brought forth in UML(Unified Modeling Language).

Finally, the system prototype and the next work are given.