When Asteroids Attack: A Simulated NASA Lunar Mission

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Distributed simulations have been widely used in DoD and NASA, where complex missions, possibly taking months and costing millions of dollars, can be simulated in a shorter time at relatively low cost. Moreover, during the simulation, valuable insights can be gained for real world operations or systems development. This presentation is a brief introduction to developed distributed simulations using High Level Architecture (HLA). HLA is a general purpose distributed simulation protocol and architecture, developed by the Simulation Interoperability Standards Organization (SISO). In the 2016 SISO Simulation Exploration Experience, a lunar exploration mission in Moon City, located Aitken basin (South Pole of the Moon) was simulated as a proof of usability and interoperability of using HLA in a distributed simulation. During the simulated mission, several federates (simulated parts) developed by different universities interacted with each other: an astronaut quarried the Regolith mining area, a lunar rover relocated building materials generated by a 3D printer in the lunar construction area, and communication satellites orbiting the moon provided communication to all physical entities. In the end, an anti-asteroid system tracked and destroyed a potentially dangerous asteroid approaching the moon. This presentation covers key distributed simulation concepts and HLA specifics including architecture, federation object models and different kinds of services. The lunar exploration mission simulation is used as a running example throughout the presentation to illustrate the points.