R5EXEC Updates

Hope Forsmann

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R5EXEC modifications to update and upgrade PVMEXEC in support of RELAP5-3D

Background

R5EXEC is a RELAP5-3D user aid program developed at the INL. It is the 2nd generation of the PVMEXEC utility program developed in 2005 by Walt Weaver. The program uses the Parallel Virtual Machine (PVM) libraries to pass messages between two processes in order to share information.

The R5EXEC API and R5EXEC program were developed to facilitate the simulation of a system (e.g., a nuclear power plant) using several different computer programs to describe the transient behavior of the system. Simulation codes are generally written to provide detailed models of some portion of a system, i.e., COBRA, RELAP5-3D, FLUENT, TRAC-PF1/MOD1, and TRACE for the fluid systems, CONTAIN and MELCOR for the containment systems, NESTLE and PARCS for reactor power, etc. The R5EXEC Application Interface (API), the R5EXEC program, and the code coupling system that they implement enable the use of different codes for the simulation of different portions of the system in a unified analysis of the transient behavior.

Discussion

The PVMEXEC capability is considered a very valuable, but underutilized tool in the RELAP5-3D suite of user aid programs. This is due in large part to the fact that is not available on the Windows platform. The decision was made to overhaul and upgrade the API and coupling programs. The first step in this process was to update the program files in the LINUX platform. This step is completed and available in the RELAP5-3D 4.3.x release. The second step in the process was to upgrade the documentation. All three programmer's manuals and the user's guide have been updated and are also available with the documentation provide in the RELAP5-3D 4.3.x release.

Possible Future Effort

A logical next step in the development of R5EXEC is to get the PVM libraries installed on a Windows platform. Thereafter, it becomes possible to adapt R5EXEC to run on Windows platforms.