Migration of the LABIHS simulator from the PA-RISC architecture to the PC architecture

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The LABIHS (Human-System Interfaces Laboratory) compact nuclear power plant (NPP) simulator is, since 2002, operating at the Nuclear Engineering Institute (IEN), Brazil. Due to the processing power required by the simulator software and the hardware available at the time, the simulator was developed under a PA-RISC architecture server (HPC3700), using the HP-UX operating system. All mathematical modeling components were written using the HP Fortran-77 programming language with a shared memory to exchange data from/to all simulator modules. In 2008, this hardware/ software framework was discontinued, with customer support ceasing in 2013, what makes it difficult to maintain and expand. On the other hand, technological progress during this period enabled cheaper and more accessible computers, such as the PC (Personal Computer) architecture, to have enough processing power to run the simulator framework. Since the PA-RISC computer architecture is incompatible with the PC one, our work group has been working, for some years, to port the simulator software to the PC architecture [1]. Part of this effort includes completely rebuilding all the graphical interface using modern software tools and programming languages which are compatible with the PC architecture. There are two important steps to achieve in the NPP simulator migration from the obsolete architecture to the PC one. The first step is the development of a new ICM (Interprocess Communication Module), which allows the data exchange between the NPP simulator currently running at the old PA-RISC architecture and other software running on modern PC computers. This step is important because it allows us to work on the new Graphical Interface while the older NPP simulator is still operating.
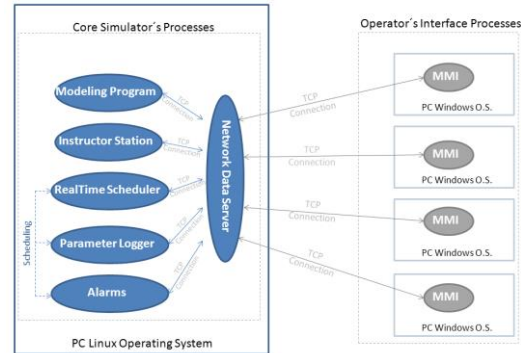

Figure 1. ICM diagram

In the Figure 1 is shown the ICM intermediating communication between core simulator processes and remote Man-Machine Interfaces. The second step is the development of the new graphical interface for the LABIHS simulator, currently under development using the LabVIEW software suit.
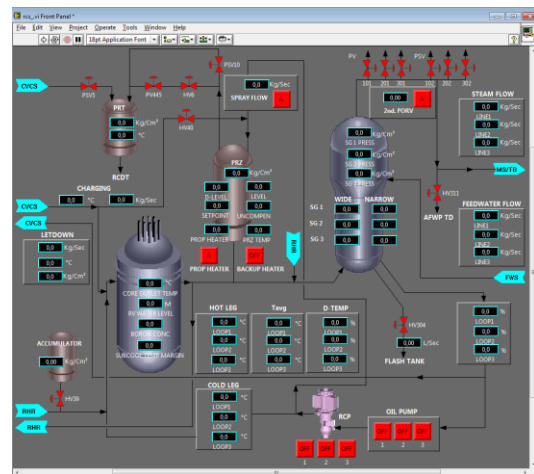

Figure 2. Reactor Coolant System screen

In the Figure 2 is shown the Frontal Panel of Reactor Coolant System screen made on LabVIEW. The last step, also currently under development, is to conclude the port of the simulator software for the PC architecture, so that the simulator may run on our Linux-based PC server.

References

[1] JAIME, G. D.; FARIAS, M. S.; AUGUSTO, S. C. Development of the new graphical interface for the LABIHS simulator using LabVIEW. In: INTERNATIONAL NUCLEAR ATLANTIC CONFERENCE, - ENFIR - Meeting on Nuclear Reactor Physics and Thermal Hydraulics, 10., 2017, Belo Horizonte. **Anais…** Rio de Janeiro: ABEN, 2017. Não paginado.