

PSCAD X4: Parallel and High Performance Computing



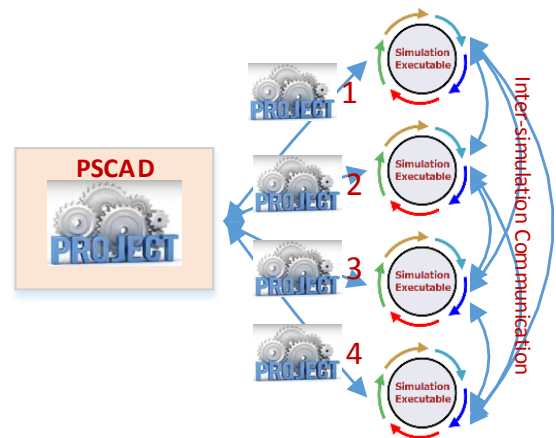
The PSCAD™ software now offers parallel processing capabilities to maximize the power of multi-core processors

PSCAD™/EMTDC™ employs parallel processing techniques to exploit the power of computers, running multiple-core processors, to significantly reduce simulation times.

Extremely large and complicated power systems can be broken up and simulated many times faster when the processing work is spread over multiple cores, using the Parallel Network Interface (PNI) feature. Parametric studies and optimization of parameters may also be performed in parallel using the Parallel Multiple Run (PMR) and Intelligent Parallel Multiple Run (PMR-I) features.

Parallel Network Interface

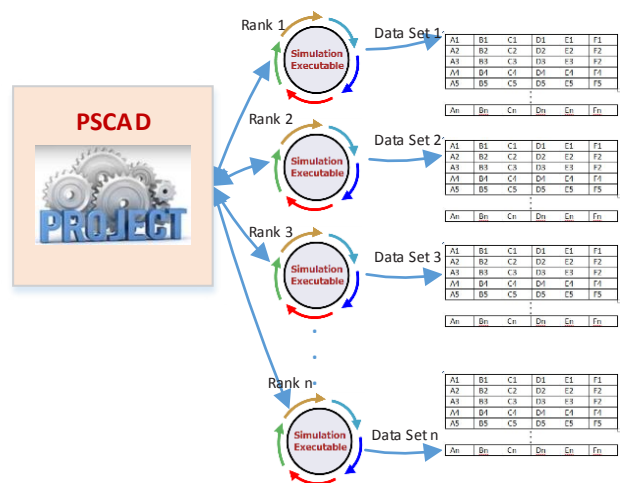
Using the Parallel Network Interface (PNI), a large power network can be broken into smaller sub-networks, interconnected and simulated in parallel. During execution, individual sub-networks run on a separate processor core and exchange values with all the others via an inter-process communication interface. Thus, using the PNI can drastically reduce the overall simulation time, when compared to running one large network on a single core.



Parallel Simulations Using PNI

Parallel Multiple Run (PMR)

For intense studies involving the running of one project under many different conditions at the same time, a type of data parallelism feature, called Parallel Multiple Run (PMR), can be used. The simulations are run simultaneously (launched as a volley) over multiple processor cores on one or more computers, thereby obtaining significantly faster results than running them sequentially on a single core.



Parallel Study Using PMR

A “rank number” component is used to uniquely identify each simulation in the volley, based on which different inputs are chosen. For example, if the simulation is launched 16 times (a volley of 16), rank number 5 identifies as the 5th simulation working on the 5th parameter set in a lookup table.



Rank Number Component



Intelligent Parallel Multiple Run

With the Intelligent Parallel Multiple Run (PMR-I), a Master/ Slave based, parallel simulation paradigm allows for a single master project to control multiple slave projects. The idea behind this feature is to support both parametric, as well as optimization-based, multiple-run studies.

Inter-project communication is achieved by using the already well defined Radio Link components, which are now able to transmit/receive across different projects. This allows for a more sophisticated and powerful means of multiple-run control.

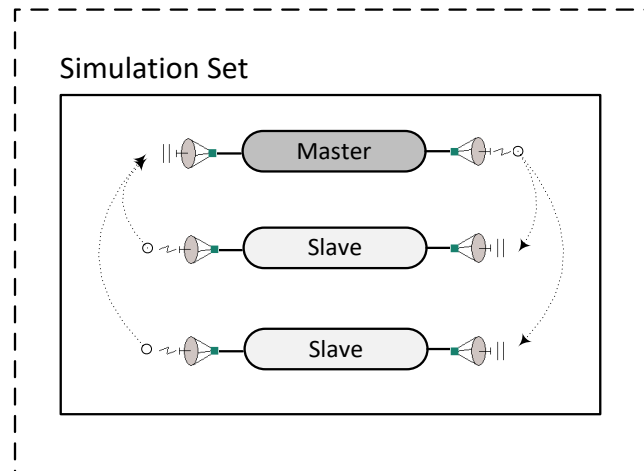
Communication between projects is performed only between runs; that is, following the end of one run and before the start of the next. In this way, the master project distributes the control parameters to the slaves, and the slaves send result data back to the master (via radio links). The master uses the results data from the slaves to generate input data before the next run starts.

See examples at:

<https://hvdc.ca/knowledge-base/topic:299/v:>

Manitoba Hydro International is committed to providing its clients with world-class training. As a new user, our team of experts can tailor a course to suit your needs, either in the comforts of your office or here at our professional training environment.

Workspace



Master/Slave Simulation Using PMR-I

Manitoba Hydro International Ltd. is a world leader in power system simulation innovation and applied engineering solutions. As the developers of the world-renowned PSCAD™/EMTDC™ software, we recognize the importance of collaborative partnerships and technologies in the global power industry.

pscad.com

Contact: sales@pscad.com

Powered by Manitoba Hydro International Ltd.

Accessible formats available upon request.

