# Interactive Monitoring Portal for Fusion Simulations

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The Center for Simulation of RF Wave Interactions with Magnetohydrodynamics (SWIM) Project is a proto- Fusion Simulation Program (FSP) whose goal is to study high-performance fusion plasmas and perform comprehensive simulations that are essential to the development of fusion. SWIM team members are geographically distributed at nine different locations and utilize a variety of supercomputers for their SWIM code runs. A distributed team running on distributed computers has the difficulty of monitoring their own code runs and discovering all historical runs. To alleviate this difficulty a computational monitoring portal based on a scalable web-based monitoring framework has been developed and deployed for the SWIM Project.

The SWIM Web Portal monitors the progress of computational simulations running on super computers and clusters, and automatically collects metadata about each computational run in real-time. The real-time graphics capability allows the scientist to monitor their run and abort it when desired so as to not waste precious CPU cycles. Furthermore, the monitoring portal provides a web-based interface for post-run analysis, such as visualizing the results, logging the user comments, and rating the quality or importance of simulations. The user interface provides rapid discovery capability via multi-field searching and sorting.

The SWIM monitoring portal leverages widely used standard open source software technologies. The development was done using the Python programming language and the Django web framework. It relies on MySQL for storing the metadata and Apache for serving the web-based user interface. It uses MDSplus data storage for data management and Memcached for data caches that support real-time data visualization. OpenID technology is used for single sign-on security that supports the multi-institutional collaboration.

The SWIM monitoring portal has been used in production since early 2010 and has to date served more than 8000 computational simulations by 15 scientists running on multiple supercomputers. This paper will describe the software architecture of the monitoring portal for fusion simulations and discuss deployment issues and user experiences for its usage to support the SWIM Project.

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