RECENT ENHANCEMENTS TO ANALYZED DATA ACQUISITION AND REMOTE PARTICIPATION AT THE DIII–D NATIONAL FUSION FACILITY[*]

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A long–term plan is being implemented to enhance the computational infrastructure of the DIII–D National Fusion Facility. One of the goals of this plan is more efficient utilization of DIII–D experimental run-time which is accomplished by decreasing the time required to analyze, store, and distribute analyzed data during tokamak operations. The transition from Vax/VMS based MDSplus to Unix based MDSplus was successfully completed resulting in faster serving of analyzed data and easier integration into the DIII–D Unix analysis environment. Presently this system serves 5100 plasma pulses representing 50 GB of analyzed data to the DIII–D National Team. A 12 processor PC Linux cluster (PIII 500 MHz) has been recently installed to perform between–pulse magnetic equilibrium reconstructions using the EFIT code. This work required modifying EFIT to use the parallel message passing interface (MPI) library so that multiple independent equilibria can be rapidly generated from experimental data. This new system calculates equilibria eight times faster than the previous system yielding a complete equilibrium time–history on a 25 ms time–interval four minutes after the pulse ends. The ability to analyze and store larger amounts of data requires a relational database for rapid data mining The commercial relational database software SQL Server 7 has been placed on a PIII 550 MHz with RAID hardware system to handle the needs of the DIII–D team. An electronic logbook utilizes this database and has several benefits over a traditional paper–based system. The logbook benefits experimental operation since the staff has the ability to see all comments in real–time and the ability to rapidly query past entries. Other databases include summary information on each run–day and on each pulse, documentation of all raw and analyzed signals, information on large code runs (e.g. EFIT, ONETWO), and detailed physics information on specific pulses. The DIII–D National Team is geographically diverse and the ability to broadcast audio/video from both the morning operations meeting and the control room during operations has been recently upgraded to a higher bandwidth and a more robust hardware/software system.

A second goal of the long–term plan is to reduce the time required for more detailed physics analysis after experimental operations. This goal is being accomplished with the underlying philosophy of uniformity, both in the look and feel of our own GUI–based tools, in terms of access methods to analyzed datasets via MDSplus and SQL Server, and access to existing computer power via a load balanced Unix cluster. Additionally, we have enhanced our remote meeting capability resulting in improved communication within the geographically diverse DIII–D Research Team. Two meeting rooms near staff offices and one room near the DIII–D control room have been outfitted with hardware for remote meetings. A Polycom ShowStation IP shows viewgraphs locally and via the Web. Complementing the ShowStation is a Polycom Viewstation that handles both ISDN and IP based video conferencing. Multi–point videoconferences are handled by an ESNET bridge allowing an unlimited number of remote sites to conduct a meeting.

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