

DEFINING the “GRID”

The “grid concept” which in the mid-90’s was the purview of a few academics is now entrenching the industrial sector. In some ways the grid started formalizing ideas that preceded it, like distributed computing environments (DCEs), but with an emphasis more akin to the parallel, cluster, NOWs, and metacomputing environments. The first demos of “grids” starting with the I-Way at SC’95, were a step beyond the high-end (supercomputer) parallel, or cluster, or NOW systems and put emphasis on creating computational capabilities where a single application can be partitioned and deploy multiple, heterogeneous and geographically distributed platforms, where each of these “nodes” could in itself be a high-end (supercomputer) system, in other words, the grid was originally viewed as a means of increasing the computational (mips & flops) power, beyond the high-end or supercomputers of that time. The dominant term for such grids has been: computational grids.

Together with efforts that built upon the notions of DCEs, and as computational grids’ environments enabled larger applications to execute, two other aspects became apparent: 1) larger capabilities also entailed larger and often distributed sets of data (consumed or produced by such applications) and 2) application models that incorporate multiple modalities of the application system (complex application models). These two aspects, pointed to other modalities of “grids”, more akin to the notions of DCE’s, where grids enable executing the various models of complex applications on different (and perhaps specialized) platforms of such a grid. Even notions like workflow, which were popular in the late 80’s and early 90’s for CIM (Computer Integrated Manufacturing) applications are again finding their way to the present grids.

All these aspects and grid modalities give the impression of a non-coherent view of what is the “grid”, it looks like the proverbial ‘parts of an elephant’. Furthermore, emerging technologies such sensors and sensor networks, and emerging concepts and directions which dynamically integrate computational and observational (measurement instruments and sensor networks) aspects, point to environments which further extend the grid notions. For these reasons, it behooves us to have a discussion for defining a concerted notion of the “grid concept”.

This panel, consisting of developers and users of grid technologies advances, and notable visionaries, will discuss their views of what’s the “grid” and how to lay the foundation of a definition for the grid.

As a Background: Programs like the DARPA Systems Environments (1996-1998), the NASA Information Powergrid (IPG, 1998-2000), and later aspects of the DOE SciDAC program (2000 – present) placed emphasis in enhanced computational capabilities provided by grids, while programs like the DARPA QUORUM Program emphasized grids along the directions of DCE. The NSF Next Generation Software Program (NGS, 1998-2004) and the follow-up Computer Systems Research (CSR , 2004-present) and the NSF Middleware Initiative (2000-present) emphasize both aspects of the grids, the first two with research emphasis the later with infrastructure emphasis. Emerging and future directions, Dynamic Data Driven Applications Systems (DDDAS), fostered by the eponymous multi-agency program, further extend the present notions of the “grid”.