Software Support for High Performance Problem-Solving on Computational Grids

Ken Kennedy

John Doerr Professor
Director, Center for High Performance Software
Computer Science MS132
3079 Duncan Hall
Rice University
Houston TX 77251-1892, USA
Phone: +1-(713)-348-5186
FAX: +1-(713)-348-5186
ken@rice.edu

Abstract

The 1999 report of the President's Information Technology Advisory Committee (PITAC)-Information Technology Research: Investing in our Future-called on the Federal government and the research community to shift their focus toward long-term, high-risk projects. This report has had a pronounced impact both on the structure of funding programs and on how we think about the entire IT research endeavor. One outcome is that researchers now think about their work in the context of some overarching effort of which it is a part. As a result, many more of us are thinking about long-term goals for IT research.

One extremely challenging problem for the coming decade is how to make it easy to develop applications for collections of heterogeneous, geographically-distributed computing platforms, sometimes called computational grids. In other words, how can we make the Internet a suitable computing platform for ordinary users? This talk will discuss the Grid Application Development Software (GrADS) Project, an effort funded by the NSF Next Generation Software Program, which is seeking to develop software strategies to simplify the problem of programming for a grid.

The GrADS effort is focusing on two challenges. First, how can we support the development of configurable object programs that can be retargeted to different collections of computing platforms and tailored for efficient execution once the target configuration is known? Second, how can we provide abstract interfaces to shield the average users from the complexities of programming for a network environment? One way to address this second problem is to make it possible for end users to develop programs in high-level domain-specific programming systems. I will discuss a new compiler framework, called telescoping languages, designed to make it easy to construct domain-specific scripting languages that achieve high performance on a variety of platforms including grids.

V.N. Alexandrov et al. (Eds.): ICCS 2001, LNCS 2073, p. 8, 2001.