

LAPACK WS: Offering Lapack over the Web
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Software-as-a-service has been recognized as the next step in the software industry and already fundamentally alters the economics of software. At almost the same time internet and the World Wide Web in general and Web Services and Cloud in particular offer the promise of virtually unlimited processing and storage power as well as applications running on widely-dispersed computers as though they are on our own desktops.

This paper presents a summary of our efforts to provide a foundation for a service-based paradigm, in which scientific computing resources and services are transparently provisioned and managed on an on-demand basis, at run-time if needed at competitive costs. We envision that web services¹ will allow us to effectively merge existing high quality scientific computing software and high performance computing infrastructure into effective and value added web computational systems.

To prove the above concept, we have implemented a set of commonly used LAPACK routines (all subroutines whose name ends with SV) as web services by

- describing them with the Web Services Description Language (WSDL),
- using messages that follow the Simple Object Access Protocol (SOAP) standard
- exploiting the features and capabilities of the Electronic Business using XML (ebXML) Registry.

Our services can be accessed in several different ways, through most of the widely used programming languages and under diverse usage scenarios (see <http://lapack.ws>) ranging from humans using Web-based graphical user interfaces to automatic invocation at run-time. We currently offering (while we are still beta-testing) our web services on a desktop computer, on a DELL cluster of total of 48 cores and on the Amazon Elastic Compute Cloud (EC2) and the Amazon Simple Storage Service (S3).

¹A web service is according to W3C a software system designed to support interoperable machine-to-machine interaction over a network.