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# Design and development of Distributed Virtual Geographic Environment system based on web services

Jianqin Zhang <sup>a, c</sup> ... Jack Teng <sup>d</sup>

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### Abstract

This paper aims to design and develop a Distributed Virtual Geographic Environment (DVGE) system. A DVGE system is an Internet-based virtual 2D and 3D environment that provides users with a shared space and a collaborative platform for publishing multidimensional geo-data, and for simulating and analyzing complex geo-phenomena. Users logging into the system from different clients can share distributed geo-information resources, including geo-data and geo-models, and can complete collaborative tasks. Web service technology provides effective solutions for constructing DVGE systems because of its ability to support multi-platform, multi-architecture, and multi-program-language interoperability on the Internet, but also because of its ability to share programs, data, and software. This paper analyzes the characteristics, relevant technologies, and specifications of web services, such as grid services, Open Geo-data

Interoperability Specifications (OpenGIS), and Geography Markup Languages (GML). The architecture and working mechanisms of the DVGE system based on web services are then elaborated. To demonstrate DVGE systems based on web services, we examine a case study of water pollution in Yangzhou City, Jiangsu Province, China, using a prototype DVGE system that is developed with Jbuilder9.0 and Java3D 1.0 packages, and the Weblogic platform 8.1.



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## Keywords

Virtual Environment; Virtual Geographic Environment; Distributed computing; Web services; J2EE; Grid services

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