



Contribution ID: 174

Type: Oral

Integrating a Wireless Sensor Network into Grid Civil Protection Applications

Thursday, 5 March 2009 18:30 (20 minutes)

The CYCLOPS project is a FP6 SSA which aims to bring together two important Communities: GMES and Grid, focusing on the operative sector of European Civil Protection (CP). Recently University of Minho has done some work testing one of the CYCLOPS case studies - GRID deployment of control and monitoring of environmental wireless sensor networks (WSN) for climate monitoring and natural disasters reaction.

Conclusions and Future Work

A functional prototype, based on DORII middleware, which provides Grid CP applications with data from a remote WSN was developed. This prototype was later improved with observations handling and services which are in conformity with the OGC SWE standards. Although valuable, some weaknesses of DORII were identified. In the future, a QoS should be used to guarantee that applications perform in real-time. Another issue to address in the future is power consumption control in sensors.

Keywords

Civil Protection, Grid middleware, wireless sensor network, Web service, OGC standards

Impact

The present approach allows CP people to access the Grid in a friendly way, for doing tasks such as remote monitoring and data collection. The collected data may be used by Grid running simulations in forecasting, comparison and integration tasks. This data is of greater importance in emergency situations. In these scenarios, the CP people may quickly request updated data from the disaster site, if a sensor network is deployed to that place, and take more appropriate decisions based on that real time raw data, or even based on simulations run over the raw data.

URL for further information

<http://pop.cp.di.uminho.pt/cyclops/>

Detailed analysis

DORII middleware was already successfully tested with several instruments, in order to integrate instruments into the Grid, to perform a remote control and monitoring, and to apply the resulting data into Grid jobs or in dissemination. In the present case, the middleware was tested with a particular instrument –a WSN - and with realistic parameters, to simulate in an effective and user friendly way, as it is required by CP applications. We implemented an Instrument Element and several Instrument Managers (IMs), which virtualize the WSN. We also developed a Custom Java interface (CJI) to connect the IMs with sensors, performing the translation of the commands/data exchanged between IMs and sensors. Since it was intended to have a long duration-offline monitoring, additional modules were implemented to manage this issue, saving the data in a database. A Sensor Observation Service (SOS), following OGC standards, was implemented. The users access the database through the SOS.

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Session Classification: New Application Areas

Track Classification: Planned or on-going scientific work using the grid