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Building Scientific Workflows for the Fisheries and Aquaculture Management Community based on Virtual Research Environments

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The management of resources related to the Fisheries and Aquaculture (FARM) domain is complex and involves different scientific activities. The people involved in the domain are distributed worldwide: scientists in the field, regional statistics departments, national governing bodies, etc. Distributed information must be produced, analyzed, processed, shared, and preserved by all multiple actors through a number of scientific workflows. The D4Science-II project provides a number of Virtual Research Environments (VREs) to address the collaboration needs of this community.

Detailed analysis

VREs are integrated environments providing seamless access to resources as well as facilities for communication, collaboration and interaction among scientists and researchers. D4Science supports the building of VREs by dynamically aggregating the needed constituents through a controlled on-demand hiring. The Food and Agriculture Organization (FAO) of the United Nations and the WorldFish Center are currently exploiting the D4Science production e-Infrastructure through a number of VREs. The AquaMaps VRE provides a map-generation environment where species distribution maps are produced by using a choice of algorithms and datasets. The ICIS VRE is a repository of statistical datasets that can be 'sliced and diced' to generate table-objects and/or graphs. The FCPPS VRE provides report templates that can be used to create country profile reports. By bringing these environments closer and enabling seamless exchange of information across VREs, complex scientific workflows can be established. For example a reporting environment (FCPPS) can present maps from large data collections (AquaMaps) and create objects such as graphs from statistical information (ICIS).

Conclusions and Future Work

The services FAO and WorldFish are provided with an excellent example of a synergic use of D4Science VREs and EGEE technologies. Scientists have access to innovative research environments, well integrated each other, facilitating data sharing and the execution of scientific workflows.

The expansion of such integrated environment to external communities, not belonging to the same Virtual Organizations, is currently the major objective of the D4Science infrastructure.

Impact

D4Science proposes a different approach consisting in the definition of Virtual Research Environments replying to several requirements for confidentiality, sharing, and collaboration of scientific workflows. Objects produced or retrieved in one environment are easily consumable in another in the context of a trusted sharing environment. These environments support the re-utilization of information to be shared, simplify data loading (load once, use everywhere), and simplify cross VRE-data-analysis and presentation.

On another hand, VREs control the sharing of resources across the members of a VO allowing a subset of

VO users to consume a subset of the VO resources easily and for a limited timeframe. VREs are created on demand without additional costs on Site and VO managers.

Furthermore, a number of the tasks to be executed under these environments require access to a large computational capacity such as the one offered by the EGEE production infrastructure. The support from EGEE production sites to the D4Science VO brings such benefit and enhances the computational power of the FARM VREs.

Keywords

Virtual Research Environments, Scientific Workflows, Virtual Laboratories

URL for further information

<http://www.d4science.eu>

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