European Schoolnet
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INTERNSHIP OFFERS 2009
(2 positions available)

European Schoolnet (**http://ww.eun.org**) is an international partnership of 31 European Ministries of Education developing learning for schools, teachers and pupils across Europe.

Applicant's profile

The interns will be working at the European Schoolnet Office, in a multinational and highly qualified software developer team. They will contribute to R&D activities around the Learning Resource Exchange (LRE) (http://lre.eun.org/). The LRE is a pan-European federation of learning resource repositories primarily developed within the MELT (http://info.melt-project.eu) and ASPECT (http://aspect-project.org) projects with support from the European Commission's eContent*plus* programmes. Currently, the LRE federates more than 20 repositories of learning resources making available a critical mass of open educational resources via a publicly available LRE service for schools (http://lreforschools.eun.org/).

Technical skills:
Advanced:
- -Object-Oriented Software Development
- -Java 1.5/1.6
- -UML
- -XML, XSD, XSL, Schematron

Basic:
- -Apache Tomcat
- -ant, svn

Depending on the topic chosen (see below):
- -lucene (http://lucene.apache.org/)
- -hadoop (http://wiki.apache.org/hadoop/)

Or:
- -J2EE: servlet, JSF/iceFaces (http://java.sun.com/javaee/javaserverfaces/)
- -Liferay/portlet (http://www.liferay.com/web/guest/home)

Languages and cultural environment:
The trainees must speak English well enough to function in a multicultural environment. They must be able to attend meetings, technical or general, where people from all European countries exchange and work together using English as a common vehicle language. Their writing skills must also be fairly satisfactory as the main documents we deal with are produced in English.

Topics[1]:

1. **Indexing learning object metadata using Hadoop:** The Learning Resource Exchange (LRE) consists mainly of an infrastructure for collecting and indexing IEEE Learning Object Metadata. Currently, this infrastructure is deployed on a single server and the indexation of the LRE metadata using the Apache Lucene framework takes up to 8 hours. Given the current growth of the federation, the number of LRE resources is expected to be multiplied by 10 within the next 24 months.
   Hadoop is a framework for running applications on large clusters built of commodity hardware. The Hadoop framework transparently provides applications both reliability and data motion. Hadoop implements a computational paradigm named Map/Reduce, where the application is divided into many small fragments of work, each of which may be executed or reexecuted on any node in the cluster. In addition, it provides a distributed file system (HDFS) that stores data on the compute nodes, providing very high aggregate bandwidth across the cluster. Both Map/Reduce and the distributed file system are designed so that node failures are automatically handled by the framework.
   The trainee will be invited to participate in a proof-of-concept study aiming at running the LRE infrastructure on Hadoop.
2. **Developing reusable LRE portlets using the Liferay Framework:** Liferay is a framework that enables the creation of reusable web components named "porlets". Portlets can be combined to rapidly build web portals. The trainee will be invited to participate in the analysis, design, and implementation of LRE portlets, i.e., reusable web components that support LRE-related functionalities such as the discovery of learning resources, the social tagging of learning resources, the management of bookmarks of learning resources, the tracking of learning resource usage, etc.
   These portlets will be used to build new portals as well as to add LRE functionalities to existing ones.
3. **Developing and testing a Protocol for Metadata Publishing:** The Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH - http://www.openarchives.org/OAI/openarchivesprotocol.html) is an XML-based protocol for metadata information retrieval. It is a synchronous messaging protocol, transmitted over HTTP and uses a fixed set of protocol requests and parameters. Results are returned in XML and conform to defined Schema XSD's, which constrain the result format. However this constraint doesn't extend down to the record level and record formats are generally agreed between clients and data providers depending upon the community of

[1] Any of these topics can also be chosen as a subject for dissertation.

practice or domain. Simply put, OAI-PMH consists of a pull-mechanism for mirroring XML documents. As many repositories prefer pushing their metadata rather than being passively harvested, there is a need for a simple and robust protocol for publishing metadata in a repository. As a lightweight protocol for depositing content from one location to another, SWORD APP (http://www.swordapp.org/) is a good candidate protocol for transporting XML documents. Similarly to what is defined in OAI-PMH, this XML document should allow for identifying, publishing, updating, and deleting metadata and their collections. The traineeship will consists of defining this XML document (XSD), examine to what extent it can be bound to SWORD APP or another transport layer, implement a prototype and, once the approach is validated, deploy it between the LRE repositories.

For more details, please contact:

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