

NEPOMUK: the Social Semantic Desktop

The objective of the NEPOMUK project is to develop a technological and methodological platform used to extend the standard desktop space to a collaborative environment for the management and sharing of knowledge through a social and organizational network. NEPOMUK aims to create methods, data and a set of tools that will, on the one hand, make it easier for people to communicate, and on the other to manage and systematise information. The study is funded by the Sixth Framework Programme of the European Union and involves 16 institutions from six countries. The Faculty of Informatics of the University of Lugano is one of the member institutions, and its concern is the software architecture of the Social Semantic Desktop.

The Internet, the Web, and email have completely overhauled the way we work and communicate with each other. These tools facilitate an ever increasing exchange of information: in their daily work, people are expected to be managing calendars, address books, and a variety of files on their computer desktops. All these data are linked to each other: think, for example, of an email message that is sent with an attachment which comes from a person whose name is recorded in our address book. The question that arises is how to manage and share all the knowledge at our disposal.

NEPOMUK aims to develop a technological and methodological platform (called 'Social Semantic Desktop') designed to provide users with effective and secure tools in order to promote exchange and sharing of knowledge.

Prof. Mehdi Jazayeri, Dean of the Faculty of Informatics, USI, tells us: *"Today's computers are organised on the basis of files. When we look for a file, we type in its name and the computer retrieves all the files containing that name. The main aim of NEPOMUK is that it converts information into knowledge (the semantic aspect) and represents knowledge in a way that can be shared and used by humans and exchanged between computers (the social aspect). We could then do the following search: in what activities have I been involved in the last*



The project's logo.

three days with my colleagues in Zurich?"

The project is funded by the Sixth Framework Programme of the European Union and brings together 16 institutions from six different countries (see box). It represents one of the largest European projects in the area of Information Society Technology (IST) which involves researchers, industrial software developers, and industrial users. Within NEPOMUK, which was launched in 2006 and scheduled to conclude at the end of 2008, the Faculty of Informatics, USI, is concerned with aspects related to software architecture. The research challenge for USI is to discover new architectural techniques applied to software design that takes advantage of semantic Web and peer-to-peer technologies in a way that simplifies the creation of applications for different kinds of uses. For example, NEPOMUK is developing an application for the bio-sciences sector: the French partner, Cognium Systems, is working closely with *Institut Pasteur* to develop iPAD, an intranet network dedicated to researchers and enabling them to organise and share their laboratory notes. This example demonstrates the power of semantic-based search, structuring, navigation, and sharing of knowledge in a particular domain such as bioscience.

The NEPOMUK Consortium

NEPOMUK brings together 16 partners from six countries: Germany (German Research Center for Artificial Intelligence-DFKI GmbH, Kaiserlautern; SAP AG; Forschungszentrum Informatik an der Universität Karlsruhe; L3S Research Center, Hannover; Irion Management Consulting GmbH), Ireland (International Business Machines - IBM Product Distribution Ltd.; Hewlett-Packard Galway Ltd.; National University of Ireland, Galway), France (Thales SA; EDGE-IT; Cognium Systems); Greece (PRC Group - The Management House S.A.; Institute of Communication and Computer Systems of the National Technical University of Athens), Sweden (Kungliga Tekniska Högskolan), and Switzerland (Ecole Polytechnique Fédérale de Lausanne; Università della Svizzera Italiana).

Semantic Web and Peer-to-Peer technology

The study focuses on two technologies: semantic Web and peer-to-peer (P2P). The semantic Web is a kind of technology which relies on a set of metadata (data about data) to enable the computer to understand the information employed by users, so that it can be used effectively. The semantic side can be illustrated by the following example: at the moment, if we search for the word 'partner', the computer will retrieve all the documents that contain the term. With semantic web technology, however, the computer will be able to understand the meaning of 'partner', hence to pull out, for instance, the list of 16 partners in the NEPOMUK project. The mechanism through which the system manages to understand the meaning of words is built on ontologies. Ontologies represent the whole of available classified information required to structure and share knowledge. The semantic Web will make it possible to add meaning to what would otherwise be a mere string of characters.

The second aspect of the project is the so-called 'peer-to-peer' technology, by means of which computers can connect with each other without going through a central server. As a result, we achieve direct sharing and exchange of data, documents and programs between and among computers and their users.

Social network systems are already in existence. Two of these are MySpace and Facebook, which make it possible for thousands of users with common interests to share online musical files, videos, photographs or other files. At the moment, however, these applications are on the web. The aim pursued by NEPOMUK is to exploit all of this potential on one's own computer, from within the applications themselves.

The Faculty of Informatics, USI

The Faculty of Informatics, USI, which opened in 2004, aims to educate IT specialists with a sound grounding in theory, skills at abstract thinking and problem solving, and abilities in project management and team work. The Faculty benefits from synergies with the other USI Faculties, active partnership with the Swiss Federal Institutes of Technology and the Politecnico di Milano, and the presence in Canton Ticino of distinguished scientific institutions, such as the Swiss National Supercomputing Centre, the Dalle Molle Institute for Artificial Intelligence (IDSIA) and the University of Applied Sciences of Southern Switzerland (SUPSI).



USI's research team working on the NEPOMUK project. Left to right: Saša Nešić, Dr Francesco Lelli, Prof. Mehdi Jazayeri, and Cédric Mesnage.

The project is planning two implementations of the software, set to be open source: one version in Java for Windows, Mac OS and Linux, and one, produced in C++, to be integrated into KDE, a graphic environment for Linux. The advantage for users is that they will be able to install the software on their own computers, integrating it into existing programs (e.g. Word, Excel or PowerPoint). When that is done, one will simply click on the icon within the program, type in the text one is looking for, and obtain the information required.

At the end of the project, an international conference is planned focusing on social engineering of the software, with papers addressing issues such as how to use the methods typical of social sciences in software engineering, and how to apply software engineering to social systems based on semantics.

"For NEPOMUK to succeed, we must secure the support and consensus of a broad community of user and developers", observes Jazayeri by way of conclusion.

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