Guest Editors’ Introduction

Services Mashups
The New Generation of Web Applications

Djamal Benslimane
Lyon University

Schahram Dustdar
Vienna University of Technology

Amit Sheth
Wright State University

The Internet and related technologies have created an interconnected world in which we can exchange information easily, process tasks collaboratively, and form communities among users with similar interests to achieve efficiency and improve performance. Web services are emerging as a major technology for deploying automated interactions between distributed and heterogeneous applications, and for connecting business processes, which might span companies’ boundaries. Various standards support this deployment, including, for enterprises, the Web Services Description Language (WSDL), UDDI, and SOAP. These standards support the definition of Web services and their advertisement to the potential user community, binding for invocation purposes, and reuse. At the same time, use of “lighter-weight” approaches to services, especially for Web applications, is increasing. Here, the Web APIs and RESTful (Representational State Transfer) reign supreme.

Service Mashups
Recently, in the context of the Web, the mashup concept has emerged, and researchers have developed a huge number of Web 2.0 applications. But what exactly does mashup mean? It simply indicates a way to create new Web applications by combining existing Web resources utilizing data and Web APIs. Mashups are about information sharing and aggregation to support content publishing for a new generation of Web applications. By extension, service mashups — the theme of this special issue — aim to design and develop novel and modern Web applications based on easy-to-accomplish end-user service compositions. Combining Web service technologies with fresh content, collaborative approaches (such as Web 2.0 technologies, tags, and microformats), and possibly Web data management and semantic technologies (RSS, RDFa, Gleaning Resource Descriptions from Dialects of Languages, and the Sparql Protocol and Rdf Query Language) is an exciting challenge for both academic and industrial researchers building a new generation of Web-based applications. Researchers have created different mashup tools and platforms, letting
developers and end-users access and compose various data that Web applications can provide. IBM’s QEDWiki (http://services.alphaworks.ibm.com/qedwiki/), Yahoo! Pipes (http://pipes.yahoo.com), Google Mashup Editor (http://code.google.com/gme/), and Microsoft’s Popfly (www.popfly.com) are some well-known examples of mashup platforms that users have largely adopted. Yet these platforms and associated tools represent only early and limited sets of capabilities that are sure to be followed by more powerful and flexible alternatives.

**Key Research Issues in Service Mashups**

Although many have already adopted the (service) mashup concept and recognized its value, realizing the concept is still challenging, and much work remains before we’ll see mashup applications in a mature stage. Let’s briefly discuss some key issues we must consider in the future to improve sharing (registration and publication), finding (search and discovery), reusing (invocation), and integrating (mediation and composition) services.

The first key challenge is that of semantic heterogeneity. Compared to data, services can present a broader form of heterogeneity. Correspondingly, the Web services research community has identified a broader form of semantics—data (I/O), functional (behavioral), nonfunctional (quality of service, policy), and execution (runtime, infrastructure, exceptions). Several research projects have looked at semantics for traditional (WSDL or SOAP) Web services to help address heterogeneity and mediation challenges, and the community took a step toward supporting the semantics for Web services by adopting Semantic Annotation for WSDL (SAWSDL) as a W3C recommendation in August 2003 (www.w3.org/2002/ws/sawSDL/). Now, attention has shifted to using semantics for community-created content, as with the Semantic MediaWiki, and for Web APIs and RESTful services, such as hRESTS, SA-REST (Semantic Annotation of RESTful Services), and smart mashups. We believe that existing mashup approaches and tools must move one step further in order to use semantics approaches to deal with service interoperability and integration (including mediatability). To do so, we must have an open eye on how we might build new solutions upon existing semantic Web technologies using appropriate Web 2.0 and Semantic Web approaches and technologies that complement each other.

Most service mashup solutions assume that the needed services are known and available somewhere on the Web. Programmableweb.com and APIHut are current approaches developers can use to share, find, and reuse Web APIs. These approaches are building a nice ecosystem in which people can reuse Web APIs and build mashups. For complex applications to meet enterprise needs, we must also develop advanced capabilities leading to dynamic configuration and composition.

**In this Issue**

The four articles in this issue address some of the challenges inherent in developing mashup-services-based advanced Web applications.

In “An Online Platform for Web APIs and Service Mashups,” E. Michael Maximilien, Ajith Ranabahu, and Karthik Gomadam propose an online mashup platform that enables the construction, reuse, sharing, deployment, and management of Web APIs and service mashups. The proposed platform’s main characteristic resides in its domain-specific language, which is introduced to explicitly represent the activities that a mashup designer must fulfill, such as data mediation and service protocol mediation. The authors have deployed the IBM sharable code platform on IBM alpha works services.

Finally, In “Understanding Mashup Development,” Jin Yu, Boualem Benatallah, Fabio Casati, and Florian Daniel provide an overview of some popular and representative mashup development tools and frameworks. Mashup in this article refers to Web applications comprising data, application logic, and UIs of existing applications or services. The authors compare and discuss these tools and frameworks by considering four dimensions: the component model, which describes the mashup components’ characteristic properties; the composition model, which specifies how components are glued to create a mashup application; the development environment, and the runtime environment. In their discussion, the authors conclude that mashup tools’ main characteristics are simplicity, usability, and ease of access. They also identify some perspectives that could improve mashup tools, such as describing UIs as components that can be reused and integrated like services.

Service mashups are becoming very important as Web applications and Web data grow. Efforts are still needed before we’ll be able to easily semantically connect existing Web applications, and we must take into account the challenges we’ve discussed here. We’re convinced that the research community will soon provide new solutions and tools that have real commercial impact.

References

Djamal Benslimane is a full professor of computer science at Lyon University, France, and a member of the LIRIS (Laboratoire d’InfoRmatique en Image et Système d’information) research laboratory. He has a PhD in computer science from Blaise Pascal University. Contact him at djamal.benslimane@liris.cnrs.fr; www710.univ-lyon1.fr/~dbenslim/.

Schahram Dustdar is a full professor of computer science with a focus on Internet technologies heading the Distributed Systems Group at the Vienna University of Technology. He is also director of the Vita Lab. Contact him at dustdar@infosys.tuwien.ac.at; www.infosys.tuwien.ac.at/staff/sdl/.

Amit Sheth is the LexisNexis Ohio Eminent Scholar and the director of the Kno.e.sis Center at Wright State University. He is a fellow of the IEEE. Contact him via http://knoesis.wright.edu/amit.