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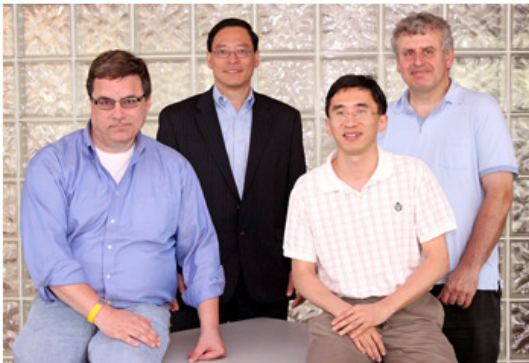ITCN > ITCN News > Semantic-Web

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Semantic Web – making sense of it all
By Gail Baker

As CIO and GVP Nick Smither pointed out in his ONE IT presentation: IT is an engine of innovation and capability for the Company. Cutting edge technology, like Semantic Web, is one of the tools that will help us deliver business value.

In support of this, ITCN is proud to present an overview of Semantic Web, plus an exclusive Ford IT interview with Dr. Jans Aasman, president and CEO of Franz, Inc., the leading vendor of Semantic Web technology, who traveled to Ford last year to consult with IT technical specialists.

(Editor's Note: Dr. Aasman's comments are his own opinion and are not endorsed by Ford, nor necessarily reflect Ford's technical direction.)

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ITCN: At the end of 2010 Franz was invited by Ford to provide consultation and training on Semantic Web technology tools. In your experience, can you quantify the improvements that you typically see when applying Semantic Web technology?

Aasman: Vendors like Franz market semantic technology in many different ways. We highlight the benefits of self describing data, easier data integration, ontologies, rules, reasoning, well adopted standards, simpler ways to perform complex queries, the linked open data cloud, etc, etc.
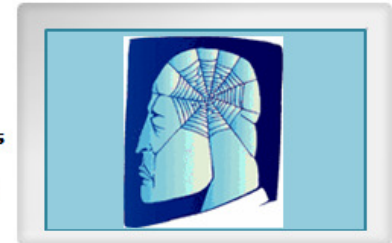
Shown here are the IT personnel currently working on Semantic Web technology, from left, Craig Plesco, Shuh-Yuan Liou, Yao Ge and Nestor Rychtyckyj. Not pictured, Faisal Waris. (Photo by Dan Murray)

Related Material

- **One-pager summary of Semantic Web authored by Shuh-Yuan Liou**
- **ITtube VIDEO: Semantic Web for Not-So-Dumb Dummies**
- **Graphic of Linked Data: using the Web to connect related data**

Seeking new Insights and Knowledge

There is an all-too-familiar paradigm encountered when searching the web. You type in a topic and then get confronted with a slew of results, many of which are not relevant. The highly technical term for this phenomenon is "digital noise." A similar thing happens with the myriad of data in a manufacturing environment. To address this, Ford is stepping up its investigation of Semantic Web; a technology designed to quiet down that noise and help make sense of it all.

So what is the Semantic Web? According to the World Wide Web consortium, Semantic Web "...allows a person, or a machine, to start off in one database, and then move through an unending set of databases (and other information sources) which are connected not by wires *but (connected) by being about the same thing.*" (Italics inserted.)

Many companies start using our Semantic Technology Enterprise Stack (AllegroGraph) for all the reasons mentioned above. However, if you ask the companies that put our technology in production, they mention primarily one huge benefit, and that is flexibility. The flexible ways to describe your data, store your data as triples, and the flexible way to perform queries, and all of this in a very scalable way.

Our biggest customer, Amdocs (NYSE: DOX), built a Semantic Platform that essentially knows everything about each telecom customer in real time. By integrating more than 40 different databases into one smart knowledge base, they see as much as a 30% reduction in the cost of call support handling, and huge opportunity to improve customer retention and customer support.

ITCN: What is the biggest challenge or barrier you foresee when developing/applying a Semantic Web application (i.e., on-line industry networks or collaboration), to an industry like auto manufacturing?

Aasman: Sometimes there can be a fuzzy line between what information must be kept under tight secrecy (e.g. upcoming styling and design data) vs. what makes sense to share across the entire organization, with suppliers, and even with competitors and the general public. A consistent and well-defined policy regarding information security and sharing should be in place before a Semantic Web solution can truly spread throughout the entire organization.

Dr. Jans Aasman

In the early days the Web mainly concentrated on the interchange of documents. Semantic Web creates an interchange of data. The beauty of the technology lies in enabling the data to be interconnected, accessible and logically analyzable.

When asked about Semantic Web Shuh-Yuan Liou, Senior Technical Leader and Manager in the Office of Technical Fellow, remarked, "The Semantic Web will transform our enterprise and industry into an intelligent environment not only for effective collaboration/learning but also for Open Innovation. Today we are still at the implementation stage of Computer Innovation but now at Ford we have already started the next wave - Distributed Intelligence. Semantic Web is the foundation and framework to leverage our global distributed intelligence to enable us to compete and win in the Knowledge Era."

One popular application of the Semantic Web is called Friend of a Friend (or FoaF). Like a number of Semantic Web applications, it uses a language called RDF (Resource Description Framework) for describing information and resources on the web. This allows the application's intelligent agents to make sense of the thousands of connections people have with each other, which may or may not be found using traditional web search engines.

Semantic Web projects already have been initiated at Ford.

"Ford IT is sponsoring a innovation project that will investigate the current state-of-the-art implementation of Semantic Web technologies, said Yao Ge, Technical Specialist from the Office of Technical Fellow. "This will include scalable triple store; ontology modeling and application development environment; and advanced query and reasoning, among others. These tools can enable fast, iterative development of Semantic Web based applications. One of the proof-of-concept prototypes that the project team will be working on is to develop an ontology that can link data across domain data sources such as manufacturing and dealer service records. This type of application can potentially empower engineers and problem solvers with new insights and knowledge from the previously disconnected silos."

Interest and support for Semantic Web within Ford has been around since 2009 but now with a sponsored innovation project in progress, Ford is progressing further in its investigation of advanced technologies.

"One of our biggest problems is the difficulty in exchanging knowledge and data between different systems," said AD Technical Specialist Nestor Rychtyckyj. "We see the Semantic Web as an enabling technology to allow us to take advantage of

An architecture like AllegroGraph lets you specify down to the level of individual triples who can see what information, but it is the organization that still has to make these tough decisions.

And Ford not alone in this. After Telecom, our biggest customers are the Intelligence Agencies and DOD organizations. And they have the same type of problem. We as a vendor can solve their technical issues in protecting data but 90 % of the problem is purely organizational.

ITCN: For a business like Ford, what are the most important first 3 steps to prepare for a successful Semantic Web application?

Aasman: a.) Develop a vision and encourage a Champion. Create a story about how Ford will deliver an amazing customer experience by combining the information in the current database silos and have a real time, integrated view of the current state of the car *and* it's user. Add to that story how Ford can save money by using this same system to streamline internal operations, waste less time on finding information and indentify trends for cars and users earlier.

b.) Shift of mindset from "chimneys" or "silos" to the concept of a flatter organization with more free-flowing information between departments. In other words: employees need to have the feeling that their job security is tied more to willingness to share information than the ability to "hoard" information.

In some companies we now see the concept of a Linked Enterprise Cloud. Each database owner describes his own database with a simple RDF ontology (one of the Semantic Technologies to describe data) and then publish the data in the company cloud. Other users then can independently and without costly inter departmental meetings start new services and do intelligence gathering, obviously starting with low hanging fruit in a bottom up way.

c.) Security protocols need to be in place to allow easy sharing of information within the company, but any information leaks outside Ford need to be easily traceable.

ITCN: Information pulled by automated agents needs to be trusted by the user. How is trust built? How is it maintained?

Aasman: In general 'trust' is an important concept on the web and in the Semantic Web. On the web it is solved by companies like Google, Ebay, Amazon, Delicious, and Reddit by involving the user in the feedback loop. Companies like Amazon and Ebay ask the user how good the seller delivered on its promises, and a seller can make only a few mistakes before he ruins his trust.

The same applies to the Semantic Web. Everyone can provide their own open linked data but if no one else points, or keeps pointing to my data elements, my database soon will be useless and forgotten.

Yes, there will always be people with malicious intent, and they will usually be able to con people for a little while, but it never lasts long before they are caught. Basically the web and the Semantic Web are self correcting evolutionary systems that work like the human body to get rid of disease.

ITCN: What research in Semantic Web technology are you the most excited about?

Aasman: a) I am most excited about Franz Inc's own research in the practical aspects of the Semantic Web, around conquering the performance and scalability issues when dealing with truly massive Semantic Web databases. Of course this is all building on the decades of experience that we have in building and fine-tuning the world's premier platform for symbolic and intelligent computing. At the Semantic Technology conference in San Francisco held this month I presented how we manage queries over trillions of triples.

b) How do you build a private enterprise data cloud that cuts through all the problems that we see with Master Data Management. Most of the readers will not be familiar with the revolution that is going on in the Semantic Web where people will publish public, government and proprietary databases as triple data sets (see: http://richard.cyganiak.de/2007/10/lod/). There are now thousands of databases out there where the primary concern of the publisher was: how do I describe my data in such a way that I can link to all the other data sources in the cloud). If companies would start doing the same thing data integration would become much easier and democratic (in the sense that it would get into the hands of more people in the company).

Oh! I get it!

Be sure to watch this week's ITtube video "Semantic Web for Not-So-Dumb Dummies"

the vast amount of data and knowledge that is spread throughout the company and make intelligent analytic decisions based on that information. Semantic web technology also allows us to create and utilize ontologies to represent knowledge concepts that will be used to increase our capability for building applications that can understand and reason with knowledge. As IBM has recently shown with the Watson system that defeated the best human players in Jeopardy, progress in Artificial Intelligence is very significant and we want to ensure that Ford takes advantage of these technologies."

c) Build real time intelligence. In the Amdocs case that I described above we built a platform where we have about 5000 triples per telecom customer that describes the customer in great detail (his social network, his status as a payer, the mood the customer is in, the chance he will churn from Telecom A to Telecom B), etc. I see applicability for this platform across numerous domains, including automotive companies.

d) d) In particular for design and manufacturing companies like Ford, I am also very excited about the prospect of merging Semantic Web with complementary technologies such as Generative Knowledge-based Engineering. With Semantic Web, you know everything going on in the company; with Generative KBE you capture expert knowledge in a more formalized manner which can then be used to generate actual product designs and engineering solutions. By linking these two in a generic and robust way, the result might be something beyond what we can quite imagine yet.

Comments