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Building Rich Internet Applications with Flex and JavaFX



Yesterday morning's keynotes were all about Rich Internet Applications, as Adobe Flex, Java ME and JavaFX were highlighted. Javapolis founder Stephan Janssen took the opportunity to officially launch the new version of Parleys.com.

First up was Bruce Eckel. The author of 'Thinking in C++' and 'Thinking in Java' has now turned to thinking in Flex. Eckel explained how he – as a Java programmer – ended up using Flex to create user interfaces. "I first tried the Java Media Framework, but it didn't support MP3." He continued checking as many GUI libraries as he could, only to conclude that "mostly, these GUI libraries do one thing well. But then you run into a wall for a lot of other things." He ended up using Flex, "not only because it looks nice, but also because there is vastly more in there than I had expected."

Eckel demonstrated how easy it is to program with Flex.

of Flex supposedly is slow", he continued. "This is not true. JavaFX doesn't do too bad, but Flex is faster." Of course, the rendering speed "also depends on the power of the machine it's running on", he admitted.

Performance benefits

As applications go back and forth between the client and the server all the time, Eckel explained how the Flex AMF3 protocol is handling that challenge faster than XML or JSON. "Flex really holds great performance benefits", he added, "which is extremely important for business applications that have to deal with synchronization." Client side data management happens to be one of the bigger challenges for RIA developers. "Generally, a lot of time is spent writing synchronization code. Flex allows to skip most of that." Adobe's James Ward stepped in for a live demo. "Synchronization is needed between the browser, the application server and the data store. Of course you don't want to write all of that code by hand." Ward demonstrated how this can be done with Flex AMF3. He then expanded the demo to synchronization in a cluster and in

an online environment using Adobe AIR. "Even when you are offline, you still can update data. When the connection comes back on, the system synchronizes automatically."

Javapolis founder Stephan Janssen was next to explain how he decided to have Parleys.com rewritten using Flex. Parleys.com offers a massive amount of Java talks – from Javapolis, JavaOne and other Java events from all over the world – combining video images with the actual presentation slides of the speakers. Janssen programmed the application for fun at first, but with over 10 TB of streamed video in just under a year, it's clear Parleys.com sort of started to lead its own life. "The decision to write a new version was made six months ago", he said. "It was still too early to use JavaFX. And Silverlight? No thanks." Flex allowed him to leverage the Java code of the earlier version of Parleys.com and to resolve the Web 2.0 and AJAX issues he had encountered while programming the first version. "One thing is still missing", he explained after an in-depth demo of Parleys.com's new features. "So far, Google doesn't index Flex applications."

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Bruce Eckel, the author of 'Thinking in C++' and 'Thinking in Java' has now turned to thinking in Flex.

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Hot Talk!

Every day, a steering comity member of JavaPolis advises us what you should not miss at JavaPolis. **Stijn Van Den Enden** helps us with our final choices.

Well, in the blink of the eye, it's the final day of the 2007 JavaPolis conference already. I really look forward to today's sessions; an interesting mix of technical and methodology oriented topics.

The day kicks off with an interesting session on Kanban. Kanban acts to limit work-in-progress and to focus on achieving a continuous flow of value to the customer. If you're interested in optimizing your development process further, you should definitely check out this session.

Next, I would recommend Evolving Agile. I really enjoyed Scott W. Ambler's previous JavaPolis sessions. According to Scott it is now time to address the uncomfortable issues we prefer to avoid. Evolving Agile promises to be a very interesting session, one I would not want to miss. After lunch it is hard to pick a session of choice. I've been

doing some research recently to leverage the dynamic and modular component runtime OSGi provides in an enterprise system and must admit I'm a big fan of the technology ever since. If you want to know what OSGi is bringing to Java then Peter Kriens' session really is the place to be.

On the other hand Chris and Olav have been doing interesting work in the area of Real Options. Real Options provides a different view on how you deal with making decisions, and isn't software development all about taking the optimal decision within the context at hand?

I've found Test Driven Development to be one of the most valuable practices in today's Agile methods. Nevertheless it is by far the most difficult one to apply. During this session Lasse Koskela, author of a book on this topic, will give insight into the different kinds of variations to the practice and guidance for doing it right.

Looks like I'm going to conclude my JavaPolis week in true 'save-the-best-for-last' style. ☺



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Increasing mobility

The three part keynote on RIA was concluded by Tim Kramer from Sun's Consumer Solutions department. "Why is Java ME to be cared about", he asked. "Because it's everywhere around us already." Two billion handsets contain Java ME. That's eight out of ten handsets that were shipped last year. And there's always more to come. PlayStation 3 has Java running in the background as well. "We are going from MSA CDLD to MSA CDC", Kramer said. "A ton of JSRs has come out – for media, messaging, location, and so on – and there's many more JSRs in the pipeline already."

MSA CDLD was developed under JSR 248 and is now shipping. It adds richer graphics to cellphone ap-

plications. "It allows the use of Java enabled games, the development of mapping applications, multimedia applications, and more." MSA CDC allows the use of this type of applications on set-top boxes and smart-phones. Sun supports the MSA developer with the Java Wireless Toolkit for CLDC and the Java Toolkit for CDC. And of course, NetBeans IDE is now available in NetBeans 6.0. "We decided to Open Source this, because that's how we bring communities together and extend them", continued Tim Kramer, giving an overview of Sun's phoneME Project and the developer resources that are available. "A lot of it is Open Source code, available under the BSD license."

Empowering developers

Kramer concluded his keynote speech with a short tour of JavaFX. "Convergence is the main driver", he

explained. "We all want applications that cross all different devices, without having to rewrite them for every type of device separately." With this goal in mind, JavaFX offers a family of products, including the JavaFX script language, desktop runtime and vertical stacks for mobile and TV. "The JavaFX script is actually running on top of Swing, allowing an easier way to write Rich Internet Applications." But there's more than just developer empowerment. "With FXMobile we can build applications that really are the window to the user's life: applications that allow interaction whenever and however the user wants. The network in your hand, that's what it really is all about." ☺

TIME	ROOM 8	ROOM 5	ROOM 4	ROOM 9
08.00 - 09.30	Breakfast			
	Java Web	Methodology	Partner Slot	Java SE
09.30 - 10.30	Wicket 2 (Martijn Dashorst)	A Kanban system for software engineering (David J. Anderson)	Location based services - Longitude, latitude and beyond (Tim Tierney, Ron Lawrence)	JSR 275 - Units specifications (Werner Keil)
	Methodology	Java SE	Partner Slot	Partner Slot
	Evolving agile (Scott Ambler)	Java for high performant 3D and 2D graphical applications (Frank Suykens)	Standards, who cares (Patrick Curran)	Exploring Terracotta - JVM Clustering in the real world (Geert Bevin)
11.30 - 12.00	Lunch			
	Java SE/EE	Methodology	Partner Slot	SOA
12.00 - 13.00	OSGi, the future of Java (Peter Kriens)	Real options in a nutshell (Olav Maassen, Chris Matts)	Innovating (with) Java (Martin van Amersfoort)	Project Tango (Harold Carr)
	Partner Slot	Methodology	Security	Partner Slot
13.00 - 14.00	The Software Factory. How to make a margin with software development projects (Bruno Segers)	Test driven development beyond the acronyms (Lasse Koskela)	The OWASP Project (Erwin Geirnaert)	Unitils - easy & maintainable unit testing (Filip Neven)

More open and transparent

Recently **Patrick Curran** was elected as Chair of the Java Community Process, and he is also Director of the JCP Program at Sun Microsystems, Inc. Parleys talks to Patrick about his interest in Java and the JCP.

What's your interest in Java? How did you come across Java in the first place?

Patrick Curran: I played a lot with home-brew interpreted languages back in the mid/late 80s. I remember downloading the source for a byte-code interpreter from Dr. Dobbs Journal and using it to create a scripting language for building text-based user interfaces. I knew that somehow this would become an important way of developing software but I didn't have the resources or the skills to take it any further. I also didn't realize that networking and security - which are fundamental to Java - would be essential if this idea was to catch on. Then Java came along and did it right.

My first direct involvement with Java was when I became manager of the Java SE conformance test development team in 2001.

What motivated you to become Chair of the JCP?

Patrick Curran: The challenge! I wanted to use my conformance-testing experience in a broader way - more outward-facing, with more community involvement. (Before this I spent most of my time on engineering management.) I also welcomed the opportunity to do more work with standards and to promote the value of standards to a wider audience.

You have done a good deal of work in standards bodies like W3C, OASIS, ... What makes you so passionate about standards?

Patrick Curran: They're really important. They were fundamental to the growth of industrial society - in developing machine tools and interchangeable parts for example - then in telephony and telecommunications, and now they're fundamental to software. As I started writing and talking about standards I realized that I'd always had this interest. I didn't start out in software - I was a researcher in economic history. I was particularly interested in the Industrial Revolution - how society was transformed during the 19th century, and the importance of standardization and regulation in that process. We're now living through a similar revolution in information technology, and standards are equally important there - maybe even more so now that the software development world is turning more to open-source.

How different is the JCP from other standards bodies?

We all do the same kind of work - we develop standards collaboratively. The JCP does have a couple of strengths that I believe set it apart from most other standards organizations: its inclusive nature (it's open to all, not just to a small group of commercial organizations who have vested interests in promoting a particular technology), and the strong emphasis on conformance testing. Many standards bodies produce only specifications. We require not only a spec but also a Reference Implementation (to prove that the spec is implementable) and a conformance test suite (TCK, or Technology Compatibility Kit) to verify that implementations conform to the specs. Each API has to prove it works in the real world before it gets out the door of the JCP.

What are your ambitions as Chair of the JCP? When your term of Chair ends, what do you want to have accomplished?

Patrick Curran: I want to help the organization become more open and transparent. Openness means involving a broader cross-section of the Java community in the process - developers and users of the technologies as well as the platform implementors and the large commercial players. It also means that we need to collaborate more with other standards bodies. (Most standards build on other standards and these are often developed by someone else.) Transparency means that we need to operate in a way that allows the entire membership - and also the broader community of non-members - to see what we're doing and to participate if they want to.

Will you measure your success in terms of numbers of participants? In terms of numbers of JSR's? Or do you have other metrics for your success as a Chair?

Patrick Curran: If we had 12 thousand members rather than the 12 hundred that we have today that wouldn't necessarily make us a stronger or more effective organization. Standards work is pretty specialized, and there's a limit to the number of organizations or individuals who want to or are able to participate. It's more important that we're inclusive and representative, and that our work is transparent to the whole Java community. As for the number of JSRs, this is a simple metric and it's helpful. (A standards body that doesn't generate standards is doing something wrong!) But the JSRs we develop must also be useful - addressing the real needs of developers and industry - and they must be of high quality. The specs must be precise and unambiguous. We need comprehensive conformance tests and high quality reference implementations. We need to deliver these with agility, which suggests that that the the amount of time it takes to get a JSR through the process is also an important metric.

You have been working in the software industry for over 20 years. What changes have you seen?

Patrick Curran: When I started back in the early 80s I was programming in assembly language on the very first single-board computers and PCs. Everything was hand-crafted - we built our own "subroutine libraries" of code for performing common tasks - such as displaying a string of text on the screen, or reading the keyboard and accepting and validating user input. We built our own tools. We defined our own interfaces. Nowadays software developers use IDEs to plug together reusable parts and services, and it's possible to generate very sophisticated applications in a matter of minutes. We've evolved from being artisans to being engineers. We're growing up.

As Chair of the JCP, you see all the exciting new stuff first hand. Can you name the three most promising new trends in Java applications?

Patrick Curran: Well - I don't know about the three most promising trends, but here are three that I find interesting and exciting. First: interactive TV and movies. Java will soon be in everybody's TV set-top box and everybody's DVD player. The OpenCable (OCAP) and Blu-ray standards are both built on Java, and they're going to transform the way that entertainment is delivered into peoples' living rooms. It won't be a one-way process any more - you'll be able to talk back.



Patrick Curran, Chair of the JCP: "We have a lot to learn from the open source community and we have a lot to offer to them."

Next, telematics for automobiles. JSR 298 is defining APIs for controlling and obtaining diagnostic information from different components in your car. You'll be able to check your fuel-level, or start your engine, or control your air conditioning or your sound system from your cell-phone. I think that's pretty cool.

Finally, real-time Java. This isn't just for robotics or space-ships - though it certainly very valuable there. It's also for any situation where you need a guaranteed response in a particular period of time. It doesn't necessarily have to be super-fast, just predictable. Financial trading is one example, and there are many others. The slot-car racing demos are pretty cool, too...

Is there a Java application that you think is cool and that you use personally?

Patrick Curran: I love books. One of these days I hope to write one myself. Publishing is a very competitive industry. It's not easy to get your first book published. (my father managed to do this at the age of 83!) so people often start by self-publishing. Blurb.com makes this easy to do. It brings book-publishing to the masses, and it's all written in Java.

How important is the JCP for the development of the Java platform?

Patrick Curran: It's fundamental. Java is built on standards. It couldn't have become as successful or as ubiquitous as it is without the collaborative, standards-based process that the JCP delivers.

A year ago, Sun moved the Java platform into the GNU General Public License. Has that impacted the work of the JCP positively or negatively?

It's been a year since Sun announced that they would open-source the platform. They're still working on the implementation, and in the JCP we're still trying to figure out what the implications will be. I think they'll be positive. We have a lot to learn from the open source community and we have a lot to offer to them.

Has this move motivated more individuals and organizations to become a member of the JCP?

Patrick Curran: I think so. Open source is here to stay, and we're working hard to figure out how to adopt the best practices from the open-source world into our standards development process. The Eclipse Foundation joined the JCP earlier this year and they won a seat on the Executive Committee in the recent elections. This is one example. I think we'll see more members of the open source community, and particularly those who are involved with OpenJDK, joining in the coming months.

How do you see the role of Java User Groups in the JCP? Can they submit JSRs?

Patrick Curran: Any JCP member - whether they're an individual or an organization - can submit a JSR. However, there's no point in submitting if you haven't built a consensus within the community. You need support from the Executive Committees to get your JSR approved, and you need to persuade people to join your Expert Group and to do the actual work. It's a big responsibility to submit a JSR - to be a spec lead. As well as a spec, you have to develop a Reference Implementation and a TCK. This takes significant resources. You have to commit to maintain and evolve these over time. There probably aren't many JUGs that could make that kind of commitment yet, and this is why most JSRs are still led by people

who are paid by corporations to do standards work. This is changing, but more in the direction of participation by open source groups than by JUGs.

Also, there's a more fundamental problem. In order to join the JCP as an institution one person must be able to sign the JSPA (the participation agreement) on behalf of the entire group. This means that you must be a legal entity - something like an incorporated non-profit organization. Most JUGs probably don't have such a formal status.

Except for the largest JUGs, it probably makes more sense for JUG members to join as individuals. Of course, we welcome everyone's participation in Expert Groups, and as reviewers of specifications. We certainly need to harness the passion and commitment of JUG members, and one way to do so would be for them to participate as part of an open source project.

How do you see the role of someone like Rod Johnson (author of "J2EE without EJB"...) in the JCP?

Patrick Curran: It's really important that in addition to the "corporate members" that we talked about a moment ago we also have active participation from people like Rod - experts who are respected within the developer community. They may not always be able to act as spec leads due to the costs and long-term commitments this role requires, but we wouldn't be able to do our work if they

didn't participate in the Expert Groups. In fact, I think it's particularly important that the Expert Groups include "independents" like Rod as well as industry representatives. They can bring a broader perspective and represent the interests of the developer community. Independent experts can also be a valuable resource to the Executive Committees. Rod came a close third in the recent election to the Java SE/EE EC and I hope he'll run again next year.

What other messages do you have for the Java community?

Patrick Curran: My message is that we're just getting started! Ten or fifteen years from now everything will be connected to everything else (computers, cars, phones, TVs, household appliances, consumer goods, even your clothing...) Java makes this possible. How about 100 billion Java-powered devices? It's coming... ☺

Patrick Curran at JavaPolis

Don't miss Patrick Curran's session today. Patrick Curran speaks in Room 4 at 10.30. As you found out during this interview, Patrick is a fan of standards. Yet, he titled his talk 'Standards. Who cares?' Go and see this man!

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Leveraging information in a SOA environment

Information can be hard to find, as it is scattered over a wide variety of legacy systems. And when you find it, you are never sure you can trust it. Using the SOA environment, organizations can address the information challenge. The major goal is to provide multiple users with trusted information through a consistent and scalable platform.

Globalization, mergers and acquisitions, supply chain issues, compliance, customer loyalty, operational costs: all these are important business challenges. But sharing information about them is not easy. The information is dispersed in silos. Some of the information may be available in different versions, it may as well be inaccurate, incomplete and inaccessible. This leads inevitably to data quality issues and lack of business view. According to **Christophe De Melio**, Master Data Management Solution Architect at IBM, information must become a strategic asset for the organization. "The alignment of SOA and information on-demand is a win-win combination. When we talk about information as a service, we are talking about how we can align the data architecture – or information on-demand – with SOA."

For the organization, it is important to make this alignment, as it will clearly increase the success rate of information on-demand. The information management capabilities help SOA to provide trusted and integrated information. Combining SOA and information on-demand, all information – structured and unstructured – can be leveraged within processes and applications. Information on-demand for SOA also leads to improved governance of how and where the information is used. At the same time, SOA exposes controlled and reusable information. In other words: without information on-demand, SOA will be subject to the old adage of garbage in, garbage out. And without SOA the organization will create a lot of data services that nobody will use.

Separation of concerns

Along the lines of the traditional separation of concerns – the separation of data, application logic, presentation and workflow – the organization also needs to separate information from applications and processes. Christophe De Melio: "There are a number of reasons. The same information needs to be accessible from many applications, not just from a single one. So there is at least the need to reuse information in a controlled manner. At the same time, a single application or consumer needs access to data not just from its own database but from a variety of structured and unstructured sources. Data that is distributed can lead to a lack of trusted information, resulting in conflicting data. The organization needs to establish a single version of the truth first, before the information can be accessed by the application."

How can an organization build a service that provides accurate, consistent and integrated information to processes and people, knowing this has to happen in an existing legacy environment with inconsistent and diverse data? "That is not always easy. The organization may define the processes it needs the information for, but at the same time the sources of the information can be disparate systems with different types of information. In the worst case, the organization has no clue where it can find the necessary information. The organization also doesn't know whether or not the information will have the right quality. This is a challenge a lot of organizations are facing today. In most cases, they don't have the luxury of starting on a green field. Their starting point is within an environment of existing legacy databases that have diverse and inconsistent data. The organization can address this challenge through the concept of information as a service."

Information as a service

The idea of information as a service is not to just replicate information on-demand into SOA. Information as a service is about positioning the relevant capabilities of information on-demand that can provide value for SOA. Christophe De Melio: "Most organizations have multiple content repositories that hold unstructured information. This diversity is not always appropriately controlled. As a consequence the organization's employees lose a lot of time searching for information. This can be solved by decoupling the consumer and the providers of the content. Putting content-centric processes and workflow technologies in place, allows the organization to manage the unstructured data effectively. When organizations adopt a more systematic approach to manage their unstructured information, content is being leveraged more efficiently than before, which leads for example to more customer satisfaction."

In the process, it is important that the organization understands the data, before it exposes it through an e-service. "Understanding data requires three major elements: consistent business and technical definitions, thorough data assessment and the use of data modeling that is aligned with the service and process models. Furthermore, data

cleansing improves the data quality and can be leveraged as a service to have consistent cleansing rules throughout the enterprise. The organization should also transform disparate data into trusted information for service enablement, and deliver virtualized data through services."

The master data challenge

The bottom line is that the concept of information as a service provides the organization with trusted, timely, consistent and complete information. That is the master data challenge. "The major goal is to provide trusted information through a consistent and scalable platform for multiple consumers. Master data management is at the core of SOA." With SOA, the organization focuses on services that are reusable and that provide the highest value for the decoupled model. That's exactly what the master data scope is about as well. "There is a reason why organizations adopt SOA and master data management together. It is how they want to improve their master data landscape over time. They define the master data services to decouple consumers from the current legacy environment and then consolidate and clean up the underlying environment while keeping the consumers separated from the transition." ☐

Christophe De Melio, Master Data Management Solution Architect at IBM:
"The organization needs trusted, timely, consistent and complete information.
That is the master data challenge."



Tools in Action

“We called it Jazz!”

Developing software in an agile team is a pain in the... Addressing pain points calls for an integrated toolset. The Jazz-project aims to build a scalable, extendable team collaboration platform for seamlessly integrating tasks across the whole software lifecycle. “We called it Jazz, despite the fact that I don’t particularly like jazz. But it is a good metaphor for the Eclipse way of software development”, said **Erich Gamma**, who shared his experience with this toolset in front of a full house at Javapolis on Tuesday evening.

“What have we learned? If things are simple, if tools are easy to use, you will use them more frequently.” Information will only be drawn from the system if data are put into the platform in the first place. When that is done in a continuous and consistent way, the information provides feedback and handles that allow for a very tight follow-up of projects.

Awareness is ‘cool’

“We learned that if something is important - think of custom item types, retrospectives, stories, adoptions, ... - we make it explicit! Also that increased awareness is ‘cool.’ Awareness about links, builds, teams, ... it is all there. When there is a problem in the making it pops up. I see a potential break and can immediately act upon it. I ‘know’ because it’s on my dashboard.” The end result is ‘improved practices’.

“Once you’ve achieved integration, your expectations will increase”, Gamma experiences. Jazz now involves 70 developers in 7 centres - Beaverton, Raleigh, Ottawa, Zürich, Saint-Nazaire, Lexington and Toronto (Jazz Development Server) - 20 testers, some 18.000 change-sets, 35.000 work items, 250 repository workspaces, 66K files, 40 builds a day... and is run on a 2-way Xeon Server running application server (WAS) and another running DB2. “There are still many things we want to enter into it.”

Team first

Erich Gamma, an IBM Distinguished Engineer, was the original leader of the Eclipse Java development environment (JDT), he is on the Project Management Committee for the Eclipse project and is one of the leaders of the Jazz project.

Component based development builds on teams of three to five developers who own the key artefacts. They plan, build and test. They are self organized and interdisciplinary. Each team is different. It has its own process but also learns and adapts in the way it does things. “On the other hand all teams must agree on core practices. Team players play many roles.” There is a lot of flexibility. Anybody could step in. “But you want the same rhythm across all teams.” Jazz! From milestone to milestone. From releases to iteration plans.

That is a challenge for the project leadership that defines themes and stories. Each team has its own build. There is an overall build with all components. “Once a week, we come together”, said Gamma. That is when component baselines are integrated. “We sign off on deliverables, API’s and strongly believe in retrospective, to learn from the past.”

Pain points

A team works most efficiently in its own sand box. “As soon as you leave your sand box, things become rough.” When a new member joins the team it takes a long time before one really gets productive. “As leadership team you want to know what is going on. What is coming next? I don’t want to ask the team ‘what have you done?’ That I want to see! I want to talk with them about issues and not just collect bullet eyes of what they’ve done.”

There are also questions about development. Tracking a broken build is painful. How to reconstruct the exact set-up of a build after a failure? Tracking progress, across the project is also painful. One is scared to build a branch... Pain points!

“When we built Jazz, the question was, what do we do first? What would be our ideal to cover all these pain points? We found that many of the pain points are because of the tools.” The tools themselves are pretty OK, but they lack integration. The pain points span across tools. “What if we had an integrated toolset to help us be effective in collaborating on one goal? That is basically Jazz.”

Three pillars

In order to do that, one has to know the organization, the project, the themes, the process, ... There are three pillars in Jazz: ‘collaboration’, ‘development’ and ‘project management’. “We started to build a dream world from scratch.” The goal being a frictionless surface for developing. “We chose for the team first.”

“Everybody is swimming in the same soup. We all make mistakes. The more people you have swimming in the soup, the higher the risk of problems. One single mistake per person a day, when you scale that up to 300 people, ... you’ll have a real problem every day.” So: the team first.

“The next step is that tools must understand components and relations between teams and components.” So tools are at the core! Not processes. “There are many different practices, rules and processes that can get in your way. Therefore Jazz is process neutral.”

Hooks

In the second part of his presentation Gamma demonstrated how and why things happen and are done within Jazz. Streams, teams, RSS-feeds on team events, rules, artefacts, builds, dashboards, ... “all the kind of transparency indicators you need in order to know what is going on in a team.” For a broken build there is a snapshot that shows the state of the failure of the build. Snapshots integrate with the rest. The benefit? “I get all the linking. That helps me when fixing a problem.” Gamma covered cooperation, process and transparency, and the flexibility of the dashboard presentations. Oh yes: “Jazz is a commercial product.”

See: www.jazz.net



Erich Gamma, IBM Distinguished Engineer: “Tools are at the core! Not processes. There are many different practices, rules and processes that can get in your way. Therefore Jazz is process neutral.”

Java for high performance 3D and 2D graphical applications

by Frank Suykens

Featuring at JavaPolis 2007, LuciadMap - a leading GIS Toolkit for high demanding Air Traffic Management systems - demonstrates how the Java platform is very well suited for building high performance 3D and 2D applications in the Geographical Information Systems (GIS) world. Techniques combining Swing and JOGL, and other developer's tricks provide the necessary boost in graphic performance.

Speaking at JavaPolis on 14 December, Luciad will share some of its eight years of advanced Java experience in the context of advanced graphical applications. The presentation focuses on some of the essential techniques used to obtain the high performance of LuciadMap and discusses pros and cons, do's and don'ts. For developers new to Java graphics, it should be clear that Java holds no limitations for high performance graphics, the more advanced Java graphics developer may pick up a few new ideas.

Foolish or brave

From the start in 1999, LuciadMap was implemented in Java. Today it is believed that the choice back then was the right one to make. The Java platform has proven to be very well suited for high performance graphical appli-

Who is Luciad?

Luciad is a Belgian software company specialized in efficiently visualizing and processing high volumes of geo-spatial data.

Luciad's main product is LuciadMap, a Java toolkit for efficient 2D and 3D visualization of large numbers of static and moving data on top of geographic information (including maps, satellite imagery, and terrain elevation) from distributed data sources in many different formats. LuciadMap is used by international customers in highly specialized areas of the GIS world, e.g., in the domain of Air Traffic Management.

Software engineers from the professional services division assess the advanced requirements of high-end systems and use Luciad's technology to implement mission critical solutions. Next to advanced software engineering, services also include consultancy, coaching and training.

www.luciad.com



Luciad Live
Frank Suykens, author of this article, has a presentation today. At 10.30, he will be speaking in Room 5 on 'Java for high performant 3D and 2D graphical applications'. Don't miss this opportunity to find out more about Luciad's exciting technology.

cations, such as high demanding 3D and 2D visualization for air traffic management systems. Moreover, the Java platform has allowed LuciadMap to take advantage of the recent hardware evolutions (such as the availability of multi-core CPUs) in a transparent way.

Java, OpenGL, and Swing

The high performance requirement for displaying static and moving geo-referenced recorded or realtime air traffic data in 3D has had a big impact on the design choices. In the early design stages, OpenGL was preferred over Java3D because OpenGL allows direct rendering of the data, without building a 3D scene graph. An internal abstraction layer allows to easily choose a specific OpenGL binding. The supported OpenGL bindings have evolved over the years, from GL4Java over JOGL to the JSR-231 binding (actually also known as JOGL). The JSR-231 binding has proven to be the most stable one, and currently provides the most rich API capability.

In this context, the use of NIO buffers is important. NIO buffers allow the setup of a pipeline to quickly pass terrain data from disk to the OpenGL hardware, without involving Java memory allocation.

Next to these design decisions, a number of language independent OpenGL techniques are employed, such as the use of vertexbuffers and other primitives for fast rendering.

Using OpenGL components in a SWING application also needs special attention, since OpenGL components are heavyweight components. Issues with moving and resizing windows, with heavyweight menu bars and tabbed panes, can often be solved by applying "Context sharing", an OpenGL functionality that is only available in the JSR-231.

Java for high performance soft-realtime applications

Java's garbage collection has always been one of the key Java characteristics, being a blessing for the developer who does not have to worry too much about memory management and at the same time a source of worry for those who are concerned with responsiveness, efficient memory usage, and performance in general. Soft-realtime applications need an almost 100% guarantee of

reaching a given display rate and responsiveness of the application. Operational ATC (Air Traffic Control) applications, for instance, require a guarantee that an update of the screen is done each 300ms. Therefore it is a challenge building soft-realtime applications with Java.

Techniques such as object pooling try to give the developer more control over memory management, but they do not always provide the optimal solution. To a large extent, the solution is provided by the Java platform itself by the garbage collection improvements and tuning possibilities in the JVM.

In the context of high performance graphical applications, special attention should be given to the concept of multi-threading.

Multi-threading

A well known principle for building responsive applications is to make proper use of multithreading. Basically all time consuming processing or I/O needs to be done in another thread than the GUI updates, so that the GUI thread is minimally blocked and can respond to user interactions. In the context of graphical applications this may not be sufficient: the graphical rendering that is part of the GUI updates may already consume a considerable amount of time, and hence have an impact on the responsiveness of the application. A typical time consuming process in the context of 2D graphical applications is label decluttering.

LuciadMap's "Paint in background" functionality uses the commonly known idea of drawing the GUI in an image on a separate thread, and then visualizing the image on the screen. Although this sounds simple, it is not always the case, since it is possible that rendering settings are changed while the rendering on the offline image is still ongoing. It means that applying the changes and the actual drawing must be properly sequenced (e.g., similarly to what a call to `invokeLater` would do).

High performance graphics at JavaPolis

With an early, strategic choice for Java technology and 8 years of experience, Luciad has demonstrated that high performance graphical applications can indeed be developed in Java. The maturity of Java and the built up experience allow Luciad to move to more and more high end, mission critical visualization applications. ☺

Blogs on JavaPolis

Reading all the blogs about JavaPolis, you get the impression you don't need to go to Antwerp to keep up to date. So many bloggers are talking about the sessions they attended, you'd think you know it all. But have a look at the pictures. Would you want to miss this great show?

Paul Bakker on JavaFX:

The second session I attended was about JavaFX. Since I really like the concept of JavaFX, and see this as one of the major interesting new technologies at the moment, I was really looking forward to this session. The session was a major disappointment to me however. Maybe not everybody shares this opinion, because I actually did hear some more positive comments, but to me the session was pretty much a big waste of time. In the three hour session, we just barely touched the basics of JavaFX, while I expect some more in-depth topics in a session called 'JavaVX in Action'. Anyone who spent half an hour browsing websites and reading documentation would properly not hear anything new here. The problem was that the pace was just way too

low, spending too much time talking about unrelated topics, and the code examples were too basic. The session left me just where I started, still having many questions about how to use JavaFX in practice.

Funny detail however was that the session's slides were written in a JavaFX application, which seemed to work quite well.

Read more on http://blogs.infosupport.com/blogs/paul_bakker/

Paris Apostolopoulos is critical of Adobe Flex:

I started my day with a large dose of [Adobe Flex](#). I have to admit this year Flex and all its related technologies are heavily marketed by Adobe and they seem to do quite a good job, they even give a free book either on Flex or [ActionScript](#) (which is an implementation of the new JavaScript Specification). Well I have been one of those users that has been very critical towards the use of Flash in the web. I am still worried about this wave of... everything flash especially when it was being used by designers to build a fancy site BUT with useless functionality and only eye candy. It seems now we have a transformation? Evolution of flash and to be more precise - Flex is a technology for developers, for us developers, that enables you to write a very interactive web application - using the usual flash

eye candy + (IMPORTANT) with a decent programmer's API, and set of tools and technologies that enable you to make use of server side technologies, manipulate data, etc.

Read all of Paris' stories on <http://javapapo.blogspot.com/>

Sebastien Arbogast about his experience as a speaker:

I gave a quickie at Javapolis today about AndroMDA. It was a first for me, and boy it was hard! My goal with this presentation was to act as a counterbalance to last year's scripting language hype, to show that yes, you CAN be productive with traditional Java frameworks. It's just a matter of tools and methodology. And because I wanted to demonstrate that, I actually challenged myself into developing a full-blown JSF/Spring/Hibernate application in front of the audience in just 15 minutes. And I must admit that I had my eyes bigger than my stomach on this one. I've repeated my demo something like ten times, and I only managed to do it once in less than 15 minutes. So that one was risky. And as a matter of fact, I made just a small mistake in my modeling that actually led me to fail showing my running application. You can find the actual application on Sebastien's blog: <http://sebastien-arbogast.com/category/javapolis/> ©



For medium-sized Java services companies, outsourcing is not a popular issue 'Short-term solution'

Most of the medium-sized Java services companies in Belgium advise against outsourcing. Outsourcing to low-wage countries is a short-term solution. It is much wiser to use existing development trajects with expert Java-specialists.

"Outsourcing just means moving your development problems to India", sneers **Bruno Denys**, CEO and co-founder of the ICT services company AE (formerly known as Application Engineers) from Heverlee. If a client really insists on it, his firm co-operates, he explains. "But we specialize in mission critical and custom built applications, and in that field, outsourcing is a rare commodity. Let's face it: developers in India haven't the faintest idea what the office of a Belgian bank looks like and how it functions. Their knowledge of the specific context is utterly lacking. We, on the other hand, know all about the local ins and outs."

Denys warns companies who are considering outsourcing that a lot of time and effort will be wasted on communication problems. "You practically need a trouble-shooter for each and every project". Consequently, the AE-director doesn't regard outsourcing as a threat to local Java-projects. "The most important part of most projects is how to get a clear view of the specifications. Developing the applications is just a small part of the whole process. With outsourcing, there's a tremendous risk that the first analysis is a failure."

However, it can be useful to study the ins and outs of outsourcing, says Denys. "This forces companies to formulate their problem in a clear and businesslike manner."

ICT services company Cegeka in Hasselt is not particularly active in off-shoring either. The firm possesses a large so-called Agile Java development factory with a staff of 50 Java-programmers. With a team like that, and the Agile method, the company can manage without the support of Indian and Eastern-European programmers. Sales and marketing manager **Daniel Eycken**: "But exceptions are always possible. For very large projects, it might be a good idea to move the bulk of the

programming business to a low-wage country." But he also points out that outsourcing consumes extra time and effort in terms of communication and project management.

Cegeka, on the other hand, does present itself as a supplier of outsourcing solutions. Recently, the company announced that Van Gansewinkel, one of the largest waste-disposal corporations in Europe, had outsourced all its IT business to Cegeka. This company manages 1500 work locations for Van Gansewinkel, more than 140 Windows servers, and several IBM AIX and Sun Solaris UNIX server clusters. It also controls the Van Gansewinkel networks in Belgium and the Netherlands.

Doubts

ICT services company Computer Support is not averse to outsourcing, but as yet there is little demand for it, says director **Dirk Leemans**. If necessary, Computer Support can delegate Java-development activities to a Java-team in Russia. But he points out that most clients have their reservations about outsourcing. "It's only a viable option for large companies with large applications, but these companies are perfectly equipped to take care of these things themselves. And medium-sized and small companies have no need for it."

Marga van Laere, responsible for the consultancy branch of ICT services company Info Support Belgium, says her clients are also reserved. She points out that outsourcing to low-wage countries is a short-term solution, no matter which way you look at it. "If you look at the costs after a few years, it turns out that you could have hired a local team for the same price. For a lot of extra money has been spent on communication, project management and testing." She assures that the development strategy created by Info Support for Java application design can compete perfectly with off-shore business in low-wage countries.

Erlend Spinnox, senior account manager at the Java-unit of ICT services company Dolmen, agrees with her. "We have all the experts we need right here."

But unlike the others, he is not convinced that the extra time spent on communication and project management

raises costs all that much. For some projects, off-shoring is a viable option. All projects are different, so it's hard to say something about it in general." Like Cegeka, Dolmen offers to take over entire IT-tasks from its clients. Recently, Picanol, a producer of weaving-ooms, outsourced all its back-office IT tasks to Dolmen.

Extra complicated

Altogether, it seems that most of the medium-sized software houses have nor the wish, nor the need for outsourcing. A typical example is Luciad, a specialist in geographical network information systems based in Leuven. **Frank Suykens**, head of product development: "Our software products are high-tech, and no part of this core-business is outsourced right now. Occasionally, our professional services use experts from outside, but most of them are from Belgian companies." So far, Luciad has never outsourced activities to India or Eastern Europe, says Suykens. "For a company like ours, with 50 employees, this adds nothing to our efficiency, and our software products are not that complicated. "If we would decide to do it, we would prefer to hire people from abroad and make them work right here."

India no longer 'hot'

India is no longer the most popular destination for outsourcing activities. That is the distinct impression of Klaasjan Tukker, chairman of the Dutch Java User Group (Nijug). Wages for IT-specialists are rising substantially in India, which means there is hardly a difference in costs any more." Tukker says many American companies are now moving their outsourcing activities to other Asian countries, like the Philippines.

In Europe, near-sourcing (off-shoring to countries less distant) is becoming more and more popular, says the Java-group chairman. "Armenia and Russia for instance. It feels closer to home."

According to Tukker, the tension on the Java labour market is incredibly high. "Almost every week, I receive at least two new requests from companies who are in search of Java programmers."



Daniel Eycken, Cegeka: "For very large projects, it might be a good idea to move the bulk of the programming business to a low-wage country."



Bruno Denys, AE: "Outsourcing just means moving your development problems to India"



Erlend Spinnox, Dolmen: "We have all the experts we need right here."



Frank Suykens, Luciad: "For a company like ours, with 50 employees, outsourcing adds nothing to our efficiency, and our software products are not that complicated."

The Future of Computing

What happens when you bring together four of the brightest developers and you ask them about the future of computing? They'll tell you all about what went wrong in the past, start tearing things down and build everything anew from the ground up. In the meantime they'll drink water, talk about beer, solve logical questions and generally have a good time. That was pretty much the scenario of Wednesday's panel with James Gosling, Neal Gafter, Joshua Bloch and Martin Odersky.

A neat kick off for the panel is: What is going on? Computers are all over the place. We got Java and things are going mobile. They are networked. If they do their job, people are not even aware of what platform they are on. Some really cool things are going on... "like Sentilla", said James Gosling referring to the little knob things they spray on the side of a bridge that will sense what every gust of wind does to the structure. The application got really popular after a bridge collapsed in the US. Another example from Nappa valley: stakes in the ground that measure moisture and those 'clip on things' that go on grapes and tells which sugar content they have. "Networks grow on the oddest places." There are thousands in the ocean, in hospitals.... Some talk to each other, others don't. Gosling recalls that people in Paris are using bluetooth chips as if they were RFID-tags. They mesh these transceivers all over the subway stations and link them to your mobile phone. "This was all to help blind people navigate through the halls of the subway." They would have this dynamic mapping. Their cell phone would tell them to go left or go right and which train to take. "And it actually works!" The drawback of such technology is that "your sense of direction will atrophy", Josh Bloch joked.

"Our current tools are inadequate", Martin Odersky remarked. Software needs become huge with concurrent computing. How do we deal with distribution and failure? He sees a huge opportunity for new program paradigms. "One thing I like about functional programs is that you could do a lot more analysis on them", Bloch suggested.

Scary

"There is no danger the world will grow out of thesis topics", Gosling remarked. "The best ideas seem to come out of a longer past", Bloch suggested. Gosling took that on suggesting a recipe for points on a Siggraph paper: "Wind the clock back 150 years, find a cool physics paper, simulate that in a graphical rendering algorithm."

Neal Gafter observes "an ever expanding supply of PhD theses, but not of PhD students. And that is a real problem."

Gosling agrees "that is scary." Digging for reasons he finds kids referring to dot.com busts when they were young, or

they're telling him "it's all being outsourced to India anyway!" But salaries in India have been going up. Outsourcing for that reason does not pay off anymore. "The number one important function for outsourcing is not for saving money, there is just nobody left out there. They all have this feeling of doom that is completely stupid." And on top of that, computers were never 'sexy'.

Great to hit the reset button

How much future has the Java VM left? "The platform is flexible enough to be moved to the future", according to Bloch. "The VM has been reasonably solid", Gosling agreed. And Sun is working very hard on compatibility of the releases. Good testing can help a lot and... there is still a lot to be done.

Gafter's view is that you can tell the age of languages as they are getting ever larger and eventually collapse under their own weight. "The cycle of birth, growth and death. It's great to hit the reset button every now and then."

On the other hand the number of API's available is amazing. Such a diversity. Gosling asks whether that reflects 'overweight' or something really functional and powerful. API's on the other hand are optional and increase the learning curve.

Some issues seem to be more 'political' than they are related to 'deployment'. "Not all deployment problems will be solved", remarked Bloch. "But as more software is used by more people we'll get better." That leads Gosling into an eulogy to the 'Run' button in IDE..."and woooshhh... all over the network. Really cool! You can press that button over and over again."

The software development process

Bloch says he'll be moving away from EMACs and use IDE. "I tried using Eclipse (....) but ultimately we need to move away from binary and trinary and rebuild the system from bottom up."

Gosling is amazed about how distributed it all is. People know each other from their e-mail address and work together not even knowing their faces. They don't even have to go to the office to work. Actually "people do more work not showing up in an office than when they did."

"Software developers are really citizens of the world!" As a software engineer, everybody learns from the internet. There is the same 'culture' everywhere. Though he would admit that gaming conferences in Japan can get really weird... Bloch asks the conference room how many people

present significantly use C++. He counts perhaps 5%. But then again, it is a Java conference. Gosling agrees that the software world is 'fractured' by technology but 'not by national boundaries, by geography'.

Gafter points out that the better language nowadays is easier to collaborate and "Java is more collaborative than C++." Gosling adds that the design of the interface then becomes as important as the software itself. "Most of the sales of high end computers is driven by gaming", Bloch remarked. "We all ride the wave taking advantage of it."

Challenge: a million lines

Odersky threw a future 'challenge' in the group: 'write a program of a million lines and prove them that all of them are true'. "I can do that", Bloch laughs, "when all lines are blank." Gosling retorts that the problem is not for a program to be infallible or not, but that it is 'useful'. "But he does 'freak out' sometimes when seeing how programmers write stuff these days. And then he gets really scared. "You don't want to get on an airplane."

"Computers are basically everywhere, whether we drive or fly. It involves software and when it breaks we're in trouble", Gafter remarked. At the same time equally 'critical systems', like in a hospital, are mere spreadsheets that don't get tested. Odersky formulates the problem differently. Mutable state and aliasing make verification difficult. The less we have of that, the better. The fewer mutable objects, the better." Bloch agrees that we will be moving towards 'immutable' in the future. ☺

Little who's who

James Gosling is known as the father of the Java programming language. He designed the original Java, implemented the compiler and virtual machine. He has been with Sun Microsystems since 1984.

Joshua Bloch is a Principal Engineer at Google. He led design and implementation of numerous Java platform features, such as the Java Collections Framework, the java.math package and the assert mechanism. He was Senior Systems Designer at Transarc, a Distinguished Engineer at Sun Microsystems and is now Chief Java Architect at Google.

Neal Gafter, previously a senior staff engineer at Sun Microsystems where he co-designed the Java language features, now works on Google Calendar. He was a member of the C++ Standards Committee and led developments of C and C++ compilers at Sun, Microtech Research and Texas Instruments.

Martin Odersky is a professor in the School of Computer and Communication Sciences at the Ecole Polytechnique Fédérale de Lausanne. He co-ordinates LAMP, the programming methods laboratory, that research structures and patterns of programs and languages. He codesigned and implemented the Pizza and GI extensions of Java and is now working on the Scala programming language that fuses object-oriented and functional programming.



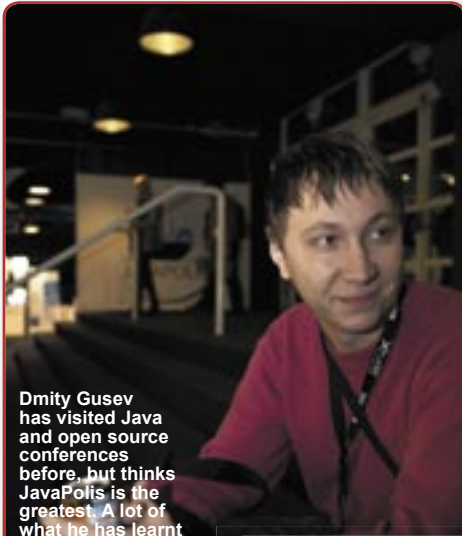
Closing time

Today is the final day of JavaPolis. Most of you agree it has once again been a success. Here's final remarks from attendees and bloggers. And see you next year.

James Weaver focuses on JavaFX:

On Tuesday, I presented a three hour "university" session entitled JavaFX in Action. To deliver the presentation, instead of creating presentation slides, I created a presentation engine in JavaFX Script that looks just like the slide templates required for the conference. This allowed me to showcase some of the JavaFX graphics and animation capabilities, and to do most of the demonstrations within the context of the slides themselves. For fun, and audience involvement, I gave away some JavaFX Script eBook downloads to audience members that asked good questions. I made paper airplanes out of the download authorization codes so that I could throw them to audience members. When this session is posted online on the JavaPolis site, I'll give you a heads-up in case you want to see it.

Read more JavaFX related news on <http://learnjavafx.typepad.com/weblog/>



Dmitry Gusev has visited Java and open source conferences before, but thinks JavaPolis is the greatest. A lot of what he has learnt here will be reused in the courses he teaches in Vladimir City University. He's one of the ten Russian attendees at JavaPolis.



Kennedy Onyancha works part-time at the Katholieke Hogeschool Kempen (Belgium), where he works on a document and knowledge sharing application. Last year he attended only the university, this year he came for the conference. "If I can afford it, I'll do the full week next year."



Hilde Van Nieuwenhove of the ING Bank is new to JavaPolis. Her main interest is Java Server Faces, as that is one of the technologies used in the new website she is building for the bank.



Tim Torbeyn of Belgian IT services company Real has mixed feelings on his first day at JavaPolis. Some sessions were very interesting, some learnt him nothing new. His main interest is Spring and Ajax.



Barry Alistair Patterson is doing research here; His news community IrishDev.com ran an Irish Java Technology Conference in Dublin, Ireland last November. In a cinema, no less. 360 attendees, but he wants his conference to become as big as JavaPolis.



San Pauwels of the European Commission complains JavaPolis had become too crowded. Over six years she missed only one edition of JavaPolis. "It's so crowded you don't get to talk to the people you want to meet." Her main interests are architecture and security.

Bert Ertman had a look at Jazz:

I'd seen Erich Gamma speak about Jazz the previous year and a few weeks back I attended a session at IBM where Jazz was also one of the topics. Erich didn't really show any new stuff that I hadn't already seen but did a nice talk on the rationale behind the whole idea and how it's coming down. The second part of the talk was supposed to be a live demo but because of some network router problems this turned into Erich showing some videos from his laptop with him doing live voice-overs. The session once again fueled my mixed feelings on the subject. On the one hand it all seems like a great idea. Team-first development and a set of integrated tools that support the process of choice instead of dictating it. On the other hand IBM is determined to ship it as a commercial product. And worse, the real power of Jazz only comes with the total stack that offers maximum integration. So if you're stuck on another version control system or another issue tracker you get much less out of it.

Read more on Bert's blog <http://blogs.infosupport.com/berte/>

For a full report of Gamma's session, turn to page 7.

More blog reports on page 9.