

Objects and Databases: State of the Union in 2006

Panel at OOPSLA 2006

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Abstract

While object-oriented programming and high-performance databases are now mainstream, programmers continue to struggle with persistent storage of objects. Juggling object persistence with requirements for simplicity, flexibility, maintainability, transparency, scalability and five-nines up-time can rattle even the most hardened architect.

It has been 10 years since the last panel on objects and databases at OOPSLA. Solutions are still evolving rapidly and increasing in complexity, with no end in sight. At the same time developers continue to experiment with alternatives, both old and new. This panel will discuss the state of the union between objects and databases, as seen from the trenches, with focus on current trends in object-oriented databases and object-relational mapping.

Robert Greene
Versant

Objects in the language and Relations in the database have always been at odds, as articulated in the classic problem known as “impedance mismatch”. The problem of “impedance mismatch” materializes itself strongly in 2 fundamental ways. One way is regarding the development burden presented by the mismatch and the other is regarding the slower performance and/or resource consumption imposed by the mismatch.

A most important event, standardization of mapping, has occurred over the last couple years and is primarily bringing relief to one of those major “impedance mismatch” issues. Relief to the issue of developer burden and improving pro-

ductivity. The standardization of ORM and the commoditization of runtimes and tooling for ORM is driving developer productivity to new heights when dealing with the complex issues of “impedance mismatch”.

There has also been some relief to the issues of performance and resource utilization. This has manifesting itself in a couple of ways. First, solving the “impedance mismatch” with ORM tools makes achieving better performance and resource utilization easier for the average developer. Solving this problem is very difficult, but with ORM runtimes offering caching and allowing flexible relational mapping pattern selection, the developer is significantly equipped to create a better solution.

Additionally, today’s ORM solutions are standards based, designed and implemented with OO modeling at the forefront. Given the OO focus of the API, implementation of the standards based API’s are possible and have been implemented by non relational databases, just minus the mapping. As a result, non-traditional database storage is a significantly more viable alternative, since developers do not have to learn a new API to take advantage of them. Developers needing an application specific database can more effectively take a “right tool for the right job” approach without fear of locking into a non-standards based solution. Object databases, which don’t suffer from the “impedance mismatch” problem, have proven to be a better solution for certain kinds of applications and have a renewed opportunity to expand their scope of use. Bio: Robert is V.P. Product Strategy responsible for defining Versant’s overall product strategy and direction. Robert provides guidance and technical expertise regarding OODMS architecture, implementation, features and future capabilities.

Robert has extensive experience in object oriented systems design. Since March 2000, as Versant’s Director Systems Engineering, Robert has helped Corporate Enterprises implement next generation business systems across the BioInformatics, Telecommunications, Defense, Finance, and Transportation industries. Robert joined Versant in 1997 when he took on the role of Director of Technical Services. Prior to Versant, Robert served as Seaboard Systems, Chief Engineer responsible for the hardware and software development of wireless systems. Robert has been a technical manager since 1987 when he began managing teams of profession-

als working on F4 and F16 Aircraft Systems for the U.S. AirForce. Robert holds a BSEE from State University of Florida.

Robert, an industry thought leader, presents regularly at Java conferences and seminars on JDO and J2EE application architectures and development. Robert is the project leader for the Eclipse JSR220 ORM tooling project, which recently merged with the Dali ORM project. Robert is leading Versant's representation in the telecommunications standardization of operational support systems (OSS) through participation in the OSS/J initiative JSR142. Robert has published numerous articles and white papers on object oriented technologies in publications such as SD Times, JavaPro, WebSphere Technical Advisor, etc.

Patrick Linskey

BEA

The relational database has become entrenched in the world of enterprise applications. Meanwhile, object-oriented languages have established a considerable enterprise presence as well. It has become common practice to convert relational database records into objects for further in-memory processing. Given this landscape, it's not surprising that frameworks that automate this conversion are thriving. In the Java space, a number of high-quality specifications exist that support object/relational mapping (ORM), as well as a handful of proprietary ORM-only solutions. The .NET and Ruby environments also have healthy, if somewhat younger, communities of ORM solutions.

The prevalence of high-quality object persistence solutions and enterprise-grade products built on top of these solutions demonstrates that the exercise of mapping an object model to a database and the exercise of solving a particular application domain problem can be decoupled. This decoupling, in turn, increases the portability of applications across different databases. Additionally, the commoditization of basic ORM naturally drives vendors to differentiate in more sophisticated ways, such as non-relational storage, data federation, sophisticated cache and QoS characteristics, self-tuning and self-healing systems, etc. Such innovation is clearly good for the industry as a whole, both in terms of increases in productivity when building basic solutions, and in terms of providing more advanced features and functionalities to applications whose development cycle would otherwise have been too constrained. Bio: Patrick Linskey has been involved in object/relational mapping for 5+ years. As the founder and CTO of SolarMetric, Patrick drove the technical direction of the company and oversaw the development of Kodo. Now at BEA, he leads the EJB team in designing and implementation of the WebLogic Server EJB solution. Patrick is one of the leaders on the EJB3 and the JDO specification teams, and is BEA's representative on the EJB3 expert group. Patrick is involved in several industry consortia, serving as a luminary on JDOcentral and as the moderator on JavaPersistence.com. He has been the face of standards-based persistence, having evangelized JDO and EJB Persistence in hundreds of talks throughout the world.

Patrick is co-author of Bitter EJB, and is on the JAOO Conference Program Committee. Patrick has also worked for TechTrader, MIT's Media Lab and Bank One in various technical roles. Under Patrick's leadership, Kodo has become the market leading JDO implementation with over 350 customers throughout the world spanning all industries, and is now the basis for the WebLogic Server EJB persistence provider. Patrick holds a B.S. in Computer Science from the Massachusetts Institute of Technology,

Erik Meijer

Microsoft

N3H Nothing New Needed Here

SQL tightly couples a query language and a data model (tables of rows). Similarly, XQuery tightly couples a query language and a data model (infosets of nodes). Many applications need to deal with both relational data and XML but are written in an OO language, and as a result real world developers pull their hair out on a daily basis.

Fortunately, the mathematicians in the first half of the last century introduced concepts such as category theory, monoids and monads, and lambda calculus that save the day because they provide a uniform way to query against arbitrary collections of arbitrary objects.

After a long gestation and a journey through functional languages, denotational semantics, and data base theory these concept have finally reached the OO mainstream. Once again, it is that useless theory that saves our day.

Bio: Erik Meijer is an architect in the WebData group at Microsoft where he currently works on language design and type-systems for data integration in programming languages. Prior to joining Microsoft he was an associate professor at Utrecht University and adjunct professor at the Oregon Graduate Institute. Erik is one of the designers of the standard functional programming language Haskell98.

Ken Rugg

Progress Software

While relational databases continue to dominate the data management landscape, specialized storage management for complex object data has been demonstrated to provide tremendous benefits for certain types of applications. It has been used in areas such as telecommunications, GIS, financial services, and event processing that require high performance while manipulating complex models. This has been shown to deliver benefits in performance and scalability for these high end applications. These benefits can be realized either in native object databases or through caching with an object-relational mapping layer. In the past few years Progress has acquired ObjectStore and Persistence software, leaders in each of these fields.

One challenge has been how to integrate this information with more traditional enterprise information sources and how to expose this information through more conventional tools such as reporting engines and forms tools. Providing better integration to these systems represents an opportunity to expand the use of object storage solutions and make them more accessible. Bio: Ken Rugg is vice president of products for the Progress Real Time Division. In this role, he is responsible for the strategic direction and development of the product line, DataXtend. Previously, Rugg was chief technology officer with eXcelon Corporation. In his 10 years at eXcelon, Rugg served in many leadership roles, ranging from technical support and education to documentation, QA and product development. Under his leadership, eXcelon established its position as the leader in XML database and XML integration technologies while maintaining its dominant position in the object database market.

Craig Russell
Sun Microsystems

JDO 2.0 and EJB3 each have been approved by the JCP. The goals of EJB3 were to unite the community, build on the expertise of all of the stake-holders in the persistence arena, and to produce a specification that would standardize operations in Java EE including web and application servers, and Java SE. The result is a standard that is well-integrated into Java EE application servers used with relational databases

Bio: Craig Russell is a senior staff engineer at Sun Microsystems. He is specification lead for Java Data Objects (JSR 12 and 243) and leads the implementation team for its reference implementation and technology compatibility kit. He is the architect of the Container Managed Persistence component of the J2EE Reference Implementation and Sun Java System Application Server. Craig is co-author of the definitive work, Java Data Objects, published by O'Reilly.

Bob Walker
GemStone Systems, Inc.

Current techniques for decomposing complex multidimensional object graphs into storage mechanisms designed for an entirely different purpose are fundamentally flawed. All have advantages and disadvantages; none supply a complete, simple and elegant solution. Popular OO languages offer little beyond codifications of mapping techniques; it's time for OO languages to extend beyond traditional offerings to provide truly transparent persistence solutions.

Bio: Bob's current role at GemStone is setting technical and marketing direction for GemStone Facets. His 16 years of experience in implementing and architecting enterprise solutions using O/R mapping, EJB, Smalltalk and Java has provided insight into a variety of persistence techniques across a spectrum of application domains. Among the many hats Bob has worn at GemStone are software engineer, software architect, consultant, trainer and manager.

Christof Wittig
DB4objects

db4objects has put object databases back onto the map by providing affordable, open source db4o ("database for objects"). This native Java and .NET engine is optimized for zero-admin environments (automatic schema evolution, in-memory process, small footprint of 400K etc.) and is extremely easy to use – one line of code stores objects of any complexity.

Our mission is to give OO developers a choice, when it comes to persistence: Relational databases do a great job in server-centric environments, where the database is "above" the application and O/R mappers take care of the mapping. However, in resource-constrained environments – without a DBA present, such as on handhelds –, persistence strategies for Java and .NET have to look different. There's no value in mapping objects to tables - only cost.

According to market research, 50% of embedded software developers still write their own database today! We have launched to fill this gap and make the lives of those OO developers much easier than it is today.

Bio: Christof brings 15 years of experience in software business, sales and marketing to his role as Chief Executive Officer of db4objects. He leads all aspects of the company's business strategy and execution as well as its marketing initiatives.

Christof serves as President of ODBMS.ORG e.V., a non-profit association to provide free resources on object database technology for education and research, and is an active member in the OMG's Object Database Technology Working Group (OBTD WG) to provide the 4th generation object database standard. He is also a frequent speaker on industry events on open source business and his thoughts have been featured in many publications. He is leading author of the Stanford research on MySQL's business model.

Christof holds a Master of Science in Management from Stanford University's Graduate School of Business, where he was a Sloan Fellow in the Class of 2004. He also holds a Master of Engineering from Technical University Munich.