

Next Generation Application Integration: Challenges and New Approaches

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Abstract

Integrating multiple heterogeneous data sources into applications is a time-consuming, costly and error-prone engineering task. Relatively mature technologies exist that make integration tractable from an engineering perspective. These technologies, however, have many limitations, and hence present opportunities for breakthrough research. This paper briefly describes some of these limitations, and enumerates a subset of the general open research problems. It then describes the Data Concierge research project and prototype that is attempting to provide solutions to some of these problems.

1. Introduction

In the current and foreseeable heterogeneous world of information technology, complex application integration will remain an inevitability. Industry estimates vary, but as much as 70% of information technology spending may be devoted to integration-related activities. Consequently, it is no surprise that the technology world is awash with software solutions aimed at making integration a more tractable task.

Over the last decade, a whole industry sector has emerged, typically known as enterprise application integration (EAI) middleware [1]. In essence, these technologies provide software infrastructures and associated tools that attempt to make it easier to build new, overarching applications from legacy systems that were never designed to work together. More recently, as the Internet has fuelled electronic business-to-business (B2B) transactions, EAI technology has broadened to accommodate B2B application integration. Overall, this creates a complex landscape of competing and overlapping technologies, many of which are proprietary and will not interoperate!

The recent emergence of XML-based Web Services promises to provide a set of standards for application integration. At the time of writing, most vendors have Web Services-enabled their EAI and B2B technologies. While Web Services are not fully mature or proven, they seem likely to become the *lingua franca* of EAI and B2B. This will make integration simpler through common

transports, data formats and associated services (security, transactions, etc).

However, more widespread standards adoption will only alleviate some of the accidental [2] complexities of EAI. Fundamental problems concerning aspects such as semantics, automatic data discovery and integration, and scalability remain as challenges for the research community.

This paper will briefly describe the current state-of-the-art in EAI technologies, and then outline some of the myriad of research problems that exist. We then describe some of our work in attempting to provide solutions for flexible, adaptive integration technologies.

2. State-of-the-Art in EAI

Figure 1 depicts the major technological components in a generic EAI solution. A brief description of the roles and responsibilities of each is below.

User Applications: Like most IT applications, EAI is concerned with creating a capability for users wishing to view and manipulate data. What characterizes the need for EAI is that the required data is spread across multiple heterogeneous data sources, such as databases, ERP applications, web sites, file systems, and so on. The user application requirements can only be satisfied through a suitable integration solution. These applications, typically custom GUIs or browser-based, call services available in the Orchestration Layer to carry out their requests.

Data Sources: The integrated solution must read and write data from existing data sources. In almost all cases, the solution must access the data sources 'as is', because other existing stovepipe applications already rely on their defined schema. It is often necessary to create new, temporary data sources to act as staging areas between systems for data consolidation and access. These temporary data sources are simply artifacts of the integration process.

Orchestration Layer: The Orchestration Layer accepts user requests and manages the fulfillment of these requests. A single input request may trigger a complex

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Next Generation Application Integration David S. Linthicum, 2004 Defines Web services and integration and the relationship between EAI and Web services Outlines the types of Web services integration from standards implementation to enabling technologies Features Web services integration scenarios and case studies *Enterprise Application Integration* Peter Lutz Pischke, 2002-07-22 Inhaltsangabe Einleitung Das Thema Enterprise Application Integration EAI ist nach eBusiness ein neuer Hype der Softwareindustrie allerdings mit einer wesentlich erhöhten Komplexität Diese Ausarbeitung verfolgt dazu einen entgegen dem Markt blühenden eigenständigen Ansatz der aus einem Prototypen und dessen Positionierung mit durchgängiger Dienstleistung besteht Der Schwerpunkt der Dienstleistung und der verwendeten Technologie ist die nonintrusive strukturelle Integration von Systemen und Anwendungen auf der Ebene der Anwendungsschnittstellen mittels nativer C bzw Java Treiber was eine lediglich von der zu integrierenden Anwendung abhängige Projektierung ermöglicht und die bestehenden IT Strukturen auf niedriger Ebene bereinigt und somit für zukünftige Anforderungen vorbereitet Den typischen Risiken der Veränderungen von gewachsenen Strukturen wird durch den integrativen Lösungsansatz unter Zuhilfenahme der bestehenden Leistungsbereiche der Firma begegnet Es besteht eine hohe Variabilität des Vorgehens mit Standards auf der Metaebene Modellebene mit hoher Priorität auf die Einhaltung international vereinbarter Standards wie XML Anforderungen an den Leser Als bergeordnete Methodik wurde Systems Engineering und der prinzipielle Aufbau von Businessplänen genutzt Die Programmtechnische Detailierung wird auf den im Haupttext dargestellten XML Codes beschränkt Somit ist die Thematik auch für Nicht ITler verständlich gehalten Um der hohen Komplexität Rechnung zu tragen wurde ein umfangreiches Glossar das vertiefende und ergänzende Informationen enthält hinzugefügt Inhaltsverzeichnis Inhaltsverzeichnis KAPITEL 1 Einleitung1 Vorstellung der Firma 1 Überblick1 Leistungsbereiche1 Kunden Auszug 2 KAPITEL 2 Systemgestaltung3 Vorgaben3 Zielbeschreibung3 Zielobjekt3 Zieleigenschaft3 Zielausmass3 zeitlicher Bezug3 Restriktionen3 Beachtung der gegebenen Rahmenbedingungen3 DirXML als zu verwendende Technologie4 Bearbeitungshinweise4 Verlässlichkeit der Informationen4 Verwendete Methodik4 Systemgestaltung und abgrenzung4 Begriffsdefinition4 KAPITEL 3 Umfeldbetrachtung EAI7 Das Produkt EAI7 Motivatoren für EAI7 Technisch begründete Motivatoren7 Betriebswirtschaftlich begründete Motivatoren8 EAI als fundamentale Basis für ebusiness9 Die Vision9 Begriffe11 Anforderungen von E Business an die IT11 Die Realität12 Die Realisierung13 Zusammenfassung14 Ursachen gegenwärtiger *User-Centric Application Integration in Enterprise Portal Systems* Oliver Gmelch, 2012 The ever growing number of application scenarios for IT systems leads to a significant increase in their number and hence to a level of complexity that has grown tremendously in comparison with early IT installations by the mid of the past decade In numerous attempts to integrate these diverging application stacks various prominent methods have emerged in the past most recently the topic of EAI which strives to achieve a consolidated view at diverse application systems However the emergence and rise

of cloud based services leads to new challenges to deal with Usage of offerings from a no further specified cloud appears appealing for IT decision makers since it promises cost savings while even enhancing flexibility to quickly respond to changing market needs To further support this idea this work focuses on the aspect of inter organisational networks that are characterised by short setup times and short time to market in order to achieve innovative products emerging from the cooperation between different actors In this context proper backing by dedicated ICT components is one of the key challenges This book therefore demonstrates how portal systems acting as intermediary between providers and consumers can be embedded into networked enterprises by providing seamless access to all relevant information To achieve this this book presents a generic architecture that can serve as a blueprint for future implementations for the type of enterprise portals introduced previously and focuses on integration of external services in a user centric manner concentrating on the user and his specific needs to achieve productivity and user satisfaction gains Moreover secure communication facilities allow to consider the current application and or user context to control exchange of information between different applications integrated on the portal platform

Integration und Flexibilität der Organisation durch Informationstechnologie Christian Horstmann, 2011-08-25 Noch immer besteht in Theorie und Praxis eine Lücke zwischen Organisations und IT Systemgestaltung Christian Horstmann stellt auf der Basis eines systemtheoretischen Ansatzes einen Zusammenhang zwischen der Integration und Flexibilität des Organisationssystems und der des IT Systems her und leitet Handlungsempfehlungen für alle strategischen IT und Organisationsentscheidungen ab *Enterprise Application Integration* David S. Linthicum, 2000 Dealing with the concepts behind a vendor's products this a guide for IT managers on how to ensure the IT infrastructure matches the need of the enterprise and which procedures should be followed to ensure this happens

The CRM Handbook Jill Dyché, 2002 CRM is an integrated information system that is used to plan schedule and control the pre sales and post sales activities in an organization This text is a manager's guide to making the most of CRM techniques for enhancing customer service sales force effectiveness and marketing strategy **Enterprise Resource**

Planning: Concepts, Methodologies, Tools, and Applications Management Association, Information Resources, 2013-06-30 The design development and use of suitable enterprise resource planning systems continue play a significant role in ever evolving business needs and environments Enterprise Resource Planning Concepts Methodologies Tools and Applications presents research on the progress of ERP systems and their impact on changing business needs and evolving technology This collection of research highlights a simple framework for identifying the critical factors of ERP implementation and statistical analysis to adopt its various concepts Useful for industry leaders practitioners and researchers in the field *Encyclopedia of Portal Technologies and Applications* Tatnall, Arthur, 2007-04-30 Informatique *Advances in Systems, Computing Sciences and Software Engineering* Tarek Sobh, Khaled Elleithy, 2006-08-15 The conference proceedings of the International Conference on Systems Computing Sciences and Software Engineering include a set of

rigorously reviewed world class manuscripts addressing and detailing state of the art research projects in the areas of Computer Science Software Engineering Computer Engineering and Systems Engineering and Sciences The International Conference on Systems Computing Sciences and Software Engineering SCSS 2005 was part of the International Joint Conferences on Computer Information and Systems Sciences and Engineering CISSE 2005 CISSE 2005 the World's first Engineering Computing and Systems Research E Conference was the first high caliber Research Conference in the world to be completely conducted online in real time via the internet CISSE received 255 research paper submissions and the final program included 140 accepted papers from more than 45 countries The whole concept and format of CISSE 2005 was very exciting and ground breaking The powerpoint presentations final paper manuscripts and time schedule for live presentations over the web had been available for 3 weeks prior to the start of the conference for all registrants so they could pick and choose the presentations they want to attend and think about questions that they might want to ask The live audio presentations were also recorded and are part of the permanent CISSE archive which includes all power point presentations papers and recorded presentations All aspects of the conference were managed on line not only the reviewing submissions and registration processes but also the actual conference Conference participants authors presenters and attendees only needed an internet connection and sound available on their computers in order to be able to contribute and participate in this international ground breaking conference The on line structure of this high quality event allowed academic professionals and industry participants to contribute work and attend world class technical presentations based on rigorously refereed submissions live without the need for investing significant travel funds or time out of the office Suffice to say that CISSE received submissions from more than 50 countries for whose researchers this opportunity presented a much more affordable dynamic and well planned event to attend and submit their work to versus a classic on the ground conference The CISSE conference audio room provided superb audio even over low speed internet connections the ability to display PowerPoint presentations and cross platform compatibility the conferencing software runs on Windows Mac and any other operating system that supports Java In addition the conferencing system allowed for an unlimited number of participants which in turn granted CISSE the opportunity to allow all participants to attend all presentations as opposed to limiting the number of available seats for each session The implemented conferencing technology starting with the submission review system and ending with the online conferencing capability allowed CISSE to conduct a very high quality fulfilling event for all participants

Software and Data Technologies Joaquim Filipe, Boris Shishkov, Markus Helfert, 2008-07-18 This book

contains the best papers of the First International Conference on Software and Data Technologies ICSOFT 2006 organized by the Institute for Systems and Technologies of Information Communication and Control INSTICC in cooperation with the Object Management Group OMG Hosted by the School of Business of the Polytechnic Institute of Setubal the conference was sponsored by Enterprise Ireland and the Polytechnic Institute of Set bal The purpose of ICSOFT 2006 was to bring together

researchers and practitioners interested in information technology and software development. The conference tracks were Software Engineering, Information Systems, and Data Management, Programming Languages, Distributed and Parallel Systems, and Knowledge Engineering. Being crucial for the development of information systems, software, and data technologies encompass a large number of research topics and applications from implementation-related issues to more abstract theoretical aspects of software engineering. From databases and data warehouses to management information systems and knowledge-based systems, next to that, distributed systems, pervasive computing, data quality, and other related topics are included in the scope of this conference. ICSoft included in its program a panel to discuss the future of software development composed by six distinguished world-class researchers. Furthermore, the conference program was enriched by a tutorial and six keynote lectures. ICSoft 2006 received 187 paper submissions from 39 countries in all continents.

Tagungsband STeP 2008 Bernhard Hollunder, Mohsen Rezagholi, 2014-06-03. Die Beiträge der Konferenz vom 12. Juni 2008 in Furtwangen mit dem Schwerpunkt Thema Softwareprodukte und Produktmanagement.

Enterprise Contract Management Anuj Saxena, 2008-02-15. Globalization increased economic and geopolitical uncertainty, technological advancements, and a rise in the number of regulations and legislations have led to a significant rise in the importance, volume, and complexity of modern contractual agreements. Yet in spite of these profound changes, many organizations still manage the contracting process in a fragmented, manual, and ad hoc manner, resulting in poor contract visibility, ineffective monitoring, and management of contract compliance and inadequate analysis of contract performance. The net effect of this has been a heightened interest in re-engineering and automation of Enterprise Contract Management (ECM) processes across industry sectors and geographies.

Enterprise Contract Management: A Practical Guide to Successfully Implementing an ECM Solution addresses all the questions surrounding ECM, ECM solutions, and the project management, change management, and risk management considerations to ensure its successful implementation. This concise text will help your organization manage the challenges of the contract life cycle and the key success factors and pitfalls in a typical ECM solution. It is a must-read for corporate executives, buyers, procurement, and strategic sourcing specialists, contract administrators, and procurement managers. There is currently no other book available on ECM solutions. All existing books on contract management focus on the legal aspects of contracts, but none describe the functions, features, capabilities of technology solutions that support ECM, nor do they explain the key considerations for ensuring a successful ECM solution implementation.

Introduction to e-Supply Chain Management David Frederick Ross, 2002-12-17. In the quest to remove supply chain costs, streamline channel communications, and link customers to the value-added resources found along the supply chain continuum, Supply Chain Management (SCM) has emerged as a tactical operations tool. The first book to completely define the architecture of the merger of SCM and the Internet.

Introduction to e-Generative AI Application Integration Patterns Juan Pablo Bustos, Luis Lopez Soria, 2024-09-05. Unleash the transformative potential of GenAI with this comprehensive guide that serves

as an indispensable roadmap for integrating large language models into real world applications Gain invaluable insights into identifying compelling use cases leveraging state of the art models effectively deploying these models into your applications at scale and navigating ethical considerations Key Features Get familiar with the most important tools and concepts used in real scenarios to design GenAI apps Interact with GenAI models to tailor model behavior to minimize hallucinations Get acquainted with a variety of strategies and an easy to follow 4 step frameworks for integrating GenAI into applications Book Description Explore the transformative potential of GenAI in the application development lifecycle Through concrete examples you will go through the process of ideation and integration understanding the tradeoffs and the decision points when integrating GenAI With recent advances in models like Google Gemini Anthropic Claude DALL E and GPT 4o this timely resource will help you harness these technologies through proven design patterns We then delve into the practical applications of GenAI identifying common use cases and applying design patterns to address real world challenges From summarization and metadata extraction to intent classification and question answering each chapter offers practical examples and blueprints for leveraging GenAI across diverse domains and tasks You will learn how to fine tune models for specific applications progressing from basic prompting to sophisticated strategies such as retrieval augmented generation RAG and chain of thought Additionally we provide end to end guidance on operationalizing models including data prep training deployment and monitoring We also focus on responsible and ethical development techniques for transparency auditing and governance as crucial design patterns What you will learn Concepts of GenAI pre training fine tuning prompt engineering and RAG Framework for integrating AI entry points prompt pre processing inference post processing and presentation Patterns for batch and real time integration Code samples for metadata extraction summarization intent classification question answering with RAG and more Ethical use bias mitigation data privacy and monitoring Deployment and hosting options for GenAI models Who this book is for This book is not an introduction to AI ML or Python It offers practical guides for designing building and deploying GenAI applications in production While all readers are welcome those who benefit most include Developer engineers with foundational tech knowledge Software architects seeking best practices and design patterns Professionals using ML for data science research etc who want a deeper understanding of Generative AI Technical product managers with a software development background This concise focus ensures practical actionable insights for experienced professionals

Electronic Government Roland Traunmueller, 2004-08-18 This book constitutes the refereed proceedings of the Third International Conference on Electronic Government EGOV 2004 held in Zaragoza Spain in August September 2004 The 92 revised papers presented together with an introduction and abstracts of 16 workshop papers were carefully reviewed and selected from numerous submissions The papers are organized in topical sections on e democracy interoperability process management technical issues e voting services processes and general assistance empowering regions methods and tools g2g collaboration change and risk management e governance ID management and

security policies and strategies geographical information systems legal aspects teaching and empowering designing Web services public information and regional developments in global context **Software Pipelines and SOA** Cory

Isaacson,2008-12-23 This is the eBook version of the print title Access to tools sample templates and source code is available through the product catalog page www.informit.com title 0137137974 Navigate to the Downloads tab and click on the link to download zip file Build Breakthrough Performance into Any SOA or Advanced Computing Application To meet unprecedented demand IT organizations must improve application performance by an order of magnitude Improving performance is even more crucial in SOA environments which demand far more computing power than older architectures Today s multi core servers can deliver the performance businesses require but few applications take full advantage of them Now software innovator Cory Isaacson introduces an easier more flexible approach to parallel processing one that any IT organization can use to attain unprecedented levels of performance Isaacson shows how Software Pipeline models can help you scale applications to any level required maximize resources deliver on challenging objectives and achieve unprecedented ROI He illuminates these techniques with real life business scenarios and proven design patterns everything architects analysts and developers need to start using them immediately This book s in depth coverage includes How Software Pipelines work what they can accomplish and how you can apply them using the Software Pipelines Optimization Cycle SPOC Scaling applications via parallel processing while guaranteeing order of processing in mission critical applications Solving performance problems in existing applications and resolving bottlenecks in existing processes A complete easy to adapt Pipelines Reference Framework Detailed code examples reflecting proven Pipelines Patterns Techniques that can be applied in any industry with any programming language Specific architectural and design solutions for common business and technical challenges The future of Software Pipelines emerging opportunities for greenfield development Tools sample templates and source code at www.informit.com title 0137137974 Download **InfoWorld** ,2001-12-10 InfoWorld is targeted to Senior IT professionals Content is segmented into Channels and Topic Centers InfoWorld also celebrates people companies and projects

Integrating SOA and Web Services N. Sudha Bhuvaneswari,S. Sujatha,2022-09-01 This book highlights how to integrate and realize Service Oriented Architecture with web services which is one of the emerging technologies in IT It also focuses on the latest technologies such as Metadata Management Security issues Quality of Service and its commercialization A chapter is also devoted to the study of Emerging standards and development tools for Enterprise Application Integration

Essentials of Logistics and Management Francis-Luc Perret,2007-09-07 The Essentials of Logistics and Management provides a broad expertly guided investigation into the knowledge required to maximize the practice of logistics in a way that contributes to a company s growth The text elaborates upon a conceptual framework in which the role of all stakeholders and possible logistics are analyzed in a systematic approach that explores customer relations management interactive information support production optimization and operations management as well as human resources and resource allocation

The purpose of this book is help managers employ vision and strategy in developing a methodology that identifies evaluates and utilizes all critical factors

Developing Cloud Native Applications in Azure using .NET Core Rekha Kodali,Dr. Gopala Krishna Behara,Sankara Narayanan Govindarajulu,2020-02-01

Guide to designing and developing cloud native applications in Azure

DESCRIPTION The mainstreaming of Cloud Native Architecture as an enterprise discipline is well underway According to the Forbes report in January 2018 83% of the enterprise workloads will be in the cloud by 2020 and 41% of the enterprise workloads will run on public cloud platforms while another 22% will be running on hybrid cloud platforms Customers are embarking on the enterprise digital transformation journeys Adopting cloud and cloud native architectures and microservices is an important aspect of the journey This book starts with a brief introduction on the basics of cloud native applications cloud native application patterns Then it covers the cloud native options available in Azure The objective of the book is to provide practical guidelines to an architect designer consultant developer who is a part of the Cloud application definition Team The book articulates a methodology that the implementation team needs to follow in a step by step manner and adopt them to fulfil the requirements for enablement of the Cloud Native application It emphasizes on the interpersonal skills and techniques for organizing and directing the Cloud Native definition leadership buy in leading the transition from planning to implementation It also highlights the steps to be followed for performing the cloud native applications cloud native patterns in the development of Cloud native applications Cloud native options available in Azure

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- _ Basics of Cloud Native Applications It covers basics of cloud native applications using NET core
- _ Cloud Native Application Patterns The reader will understand the patterns for developing Cloud Native Applications
- _ Cloud Native Options available in Azure The reader will understand the different options available in Azure
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- _ Developing cloud native applications leveraging Microservices The reader will understand the concepts of developing micro services using the Azure API Gateway Manager
- _ Developing Integration capabilities using serverless architecture The reader will understand the integration capabilities and various options available in Azure
- _ Developing a simple IoT application The reader will understand the basics of developing IoT applications
- _ Developing a simple ML based application The reader will understand Machine Learning basics and how to develop a simple ML application
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