

LIXI Visible Loans Reference Architecture and Implementation: Distributing LIXI Data as a “Newscast”



An Approach using RESTful Services and ATOM Publishing Protocol

Liming Zhu, Barry Thomas

¹National ICT Australia (NICTA), ²LIXI

Liming.Zhu@nicta.com.au

March 2008



Australian Government
Department of Broadband, Communications
and the Digital Economy
Australian Research Council

NICTA Members



Department of State and
Regional Development



The University of Sydney



Griffith
UNIVERSITY

QUT

Queensland University of Technology

The University
Of Queensland
AUSTRALIA

NICTA Partners

Agenda

- About NICTA
- Project Background and Motivation
- Project Output
- Publishing Structured Data and Subscribing to Changes
 - Publish-Subscribe Model
 - Publish LIXI data as *Web resources* (RESTful Approach)
 - Subscribe to changes using “feed” technologies (RSS/ATOM)
- Demonstration
- Conclusion

About NICTA (National ICT Australia)

- Established 2002
- Funded by government and partner Uni.
- 421 research staff, 293 postgrad students
- Our group: Managing Complexity (software engineering)
 - Business and software processes
 - Software architectures





Project Background

- NICTA research:
 - **Goal:** *software infrastructure platform* for cross-business interoperoperation
 - Specialists in providing organizations with abilities to:
 - Automate business processes (BP)
 - Adapt to business changes quickly and at low cost
 - Bootstrap vertical-industry specific solutions
- LIXI goals:
 - Vocabularies (schema); Conversations (process)
 - Implementation guidance and technical interoperability
- Joint LIXI – NICTA Project
 - “*Visible loans*” focuses on loan data dissemination

Motivation

- Reduce infrastructure cost
 - No heavyweight Web services and middleware
- Make data publishing/consumption *simple* and *timely*
 - Accommodate different data consumption capabilities
 - Allow intermediaries to add value (mash-up)
- Promote technology-level interoperability
 - Mass interoperability
 - Reduce cost of change for pair-wise connections
- Create a federated business-technical model
 - Allow autonomy while promoting cooperation
 - Accommodate different planned and un-planned uses

Analogy to Other Federated Models

	Social Networking	Lending Industry
Players	MySpace, Facebook, LinkedIn, Plaxo, Salesforce... 	Lenders, Brokers, Insurers, Aggregators...
Federated business-technical model	Google OpenSocial Specification 	LIXI Visible Loan API Specification (Ref. Arch.&Impl.)
Functions	Distribute people info + Pub/Sub + Persistence	Distribute loan info + Pub/Sub + Adaptation
Technologies	GData (extension of ATOM) RESTful API just proposed	RESTful API + LIXI extension of ATOM
Future	Data mash-up, “gadget” hosting, info. collection	Process mash-up, richer interfaces, info. sharing

Project Output

- White Paper: “*LIXI Visible Loans – a Pub-Sub based Service*”
 - How to **publish structured LIXI data** using REpresentational State Transfer (RESTful) services
 - How to **publish and subscribe to change notification** using ATOM Publishing Protocol (APP)
- Implementation
 - Server side: Loan information publishing server
 - Native XML database + REST/APP based publishing module
 - Business process coordination and adaptive platforms
 - Client side: Client library + Excel plug-in

Existing Approaches

- Proprietary
- SOAP/WS-* based Web Services
 - Infrastructure cost and complexity; fine-grained “methods”
 - Change notification - WS-Eventing/Notification: in progress
- Basic Web
 - Some degree of abuse
 - Our Approach: Use the Web *correctly* and programmably (REST)
 - Web x.0: Browser ->Data APIs(e.g. GData)/Mashup/AJAX -> Semantic Web
 - Change notification
 - New HTTP method (MONITOR); HTTP-Notify: still in progress
 - Our Approach: Feed technologies (ATOM Publishing Protocol)

The “Visible Loan” Approach (1/2)

- Publish-Subscribe Model
- Basic Web for publishing structured LIXI data (XML)
 - Exploit the basic principles that have made Web a success
 - Scalability and low infrastructure cost
 - Expose LIXI data over HTTP as URI identifiable resources
 - Interoperability and adaptability
 - Use configuration/Visual mapping
 - Low development cost
 - Allow controlled extensions made by individual publishers
 - Federated cooperation model with local autonomy


The “Visible Loan” Approach (2/2)

- “Feed” technologies for subscribing to changes
 - Simple feed consumption: desktop/AJAX feed readers, spreadsheet...
 - Low entry barrier for data consumption
 - Extensible for “smarter” client/intermediary consumption and value-add
- Client libraries
 - Bootstrap different technologies
 - VBA, Java, PHP...
 - Bootstrap different use including un-planned use
 - Broker, Financial planner, Borrower, Aggregator, Insurance

Understanding REST

- Representational State Transfer (REST)
- REST is an *architectural style* for distributed systems
 - Additional constraints on existing client-server style
 - Scalability, evolvability, interoperability and visibility
 - Responsible for the success for the Web (HTTP1.1)
- RESTful services
 - Alternative/complimentary approach to “Big” Web services
 - Use the “Web” correctly and programmably
 - Examples: *Amazon, Google...*
- “Visible Loan” project: Innovative application of REST to LIXI data dissemination

Understanding ATOM

- “Feed” technologies 
 - RSS and its variations
 - Internet Engineering Task Force (IETF) ATOM/APP
 - Extensible: e.g. Google GData API
- “Visible Loan” project: Innovative application of APP in Pub-Sub based services

Loan Information Publishing Server

- Server side features

- Resource Oriented Architecture (ROA)
 - Direct data exposure; Extensible
- Publishing LIXI XML and ATOM feeds
 - Metadata and micro-standards within feeds; Extensible
- Visual mapping between LIXI schema and ATOM schema
 - Low change cost for evolving LIXI schema and requirements
- Adaptive caching and archiving mechanisms
 - High performance; overcome common feed limitation



- Client side features

- Standard feed reader compatible; Microsoft Excel plug-in
- Reusable libraries

Demonstration
15 mins

Federated Collaboration beyond Data Schema

	Any Industry	Lending Industry
Players	Many players in a social-technical and Ultra-Large-Scale system	Lenders, Brokers, Insurers, Aggregators...
Federated business-technical model	Data schema + technical standards with the right level of prescription	LIXI Reference Architecture and Reference Implementation
Functions	Distribute business data + coordinate business activities + Adaptation	Example: distribute loan info + PubSub + adaptation (more complex business processes and adaptations?)
Technologies	Select the most appropriate solution (RESTful SOA, Big SOA, Workflow engines...)	Example: RESTful API + LIXI extension of ATOM (more process intensive scenarios -> process mash-up?)

- Leading edge technologies
 - Mass technical interoperability in Ultra-Large-Scale systems
 - Adaptive business process management
- Business benefits
 - Federated business-technical model -> industry needs
 - Pub-Sub based data dissemination -> low architecture cost
 - Ease of data publishing -> low development cost
 - Low infrastructure complexity -> low infrastructure cost
 - Mass interoperability/Highly adaptable -> low change cost
 - Vertical industry targeted -> out-of-the box solution

Questions?



NICTA Contact:

Paul Mackie, NICTA Bus. Dev. Paul.Mackie@nicta.com.au

Dr. Liming Zhu, Researcher, Liming.Zhu@nicta.com.au

Prof. Ross Jeffery, Group Leader, Ross.Jeffery@nicta.com.au

LIXI Contact: Barry Thomas

