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

An Approach using RESTful Services and ATOM Publishing Protocol

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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 interoperation
  – 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

<table>
<thead>
<tr>
<th>Players</th>
<th>Social Networking</th>
<th>Lending Industry</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>MySpace, Facebook, LinkedIn, Plaxo, Salesforce...</td>
<td>Lenders, Brokers, Insurers, Aggregators...</td>
</tr>
<tr>
<td>Functions</td>
<td>Distribute people info + Pub/Sub + Persistence</td>
<td>Distribute loan info + Pub/Sub + Adaptation</td>
</tr>
<tr>
<td>Technologies</td>
<td>GData (extension of ATOM) RESTful API just proposed</td>
<td>RESTful API + LIXI extension of ATOM</td>
</tr>
<tr>
<td>Future</td>
<td>Data mash-up, “gadget” hosting, info. collection</td>
<td>Process mash-up, richer interfaces, info. sharing</td>
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• 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

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<th>Players</th>
<th>Any Industry</th>
<th>Lending Industry</th>
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<tbody>
<tr>
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<td>Many players in a social-technical and Ultra-Large-Scale system</td>
<td>Lenders, Brokers, Insurers, Aggregators...</td>
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<tr>
<th>Federated business-technical model</th>
<th>Data schema + technical standards with the right level of prescription</th>
<th>LIXI Reference Architecture and Reference Implementation</th>
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<th>Functions</th>
<th>Distribute business data + coordinate business activities + Adaptation</th>
<th>Example: distribute loan info + PubSub + adaptation (more complex business processes and adaptations?)</th>
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| 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?) |
Conclusion

• 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?

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