

Web Service Technologies and Real World Applications

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Agenda

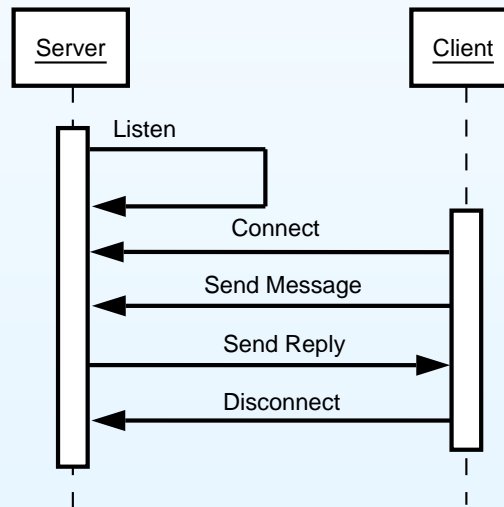
- Background
- 1st Generation Web Services
- Applications of Web Services
- 2nd Generation Web Services
- Motivating Case Study
- Conclusions/Questions

Section I

Background

What is a Distributed System?

“A distributed system is a system in which computations are performed by separate programmes, normally running on separate pieces of hardware, that cooperate to perform the same task as a whole.” *



*Lethbridge & Laganière

What are Web Services?

“A Web service is a software application identified by a URI, whose interfaces and binding are capable of being defined, described and discovered by XML artifacts and supports direct interactions with other software applications using XML based messages via Internet-based protocols” *

- Resources on demand
- Access achieved in a standard way
- Promotes loose coupling
- Identified by URI
 - e.g. <http://www.mysevice.org/calc>

*W3C

Section II

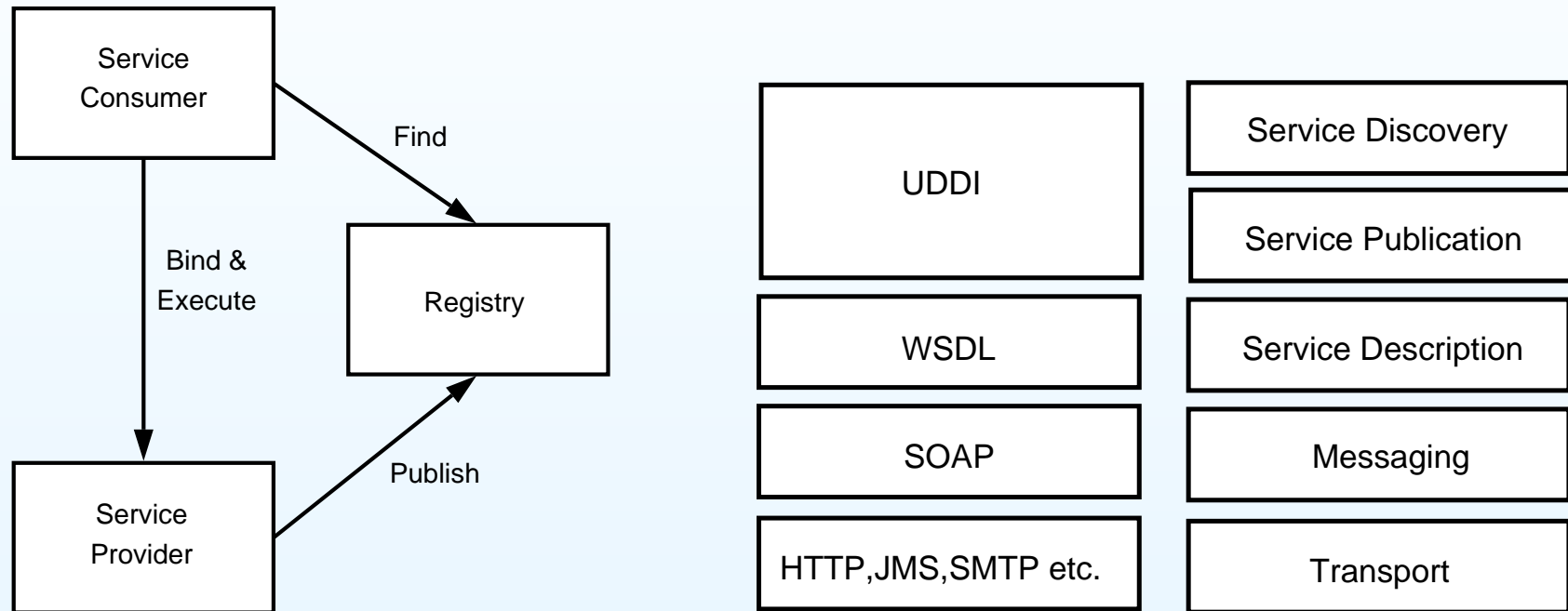
1st Generation Web Services

1st Generation Web Service Technologies

- Core Technologies
 - XML - Structured text/information
 - XML Schema - Constrains XML
 - HTTP - Conveys information
- WS Technologies
 - WSDL - Describes interface
 - SOAP - Message exchange protocol
 - UDDI - Describes functionality (registry)

Web Services - Uncontrolled Environment

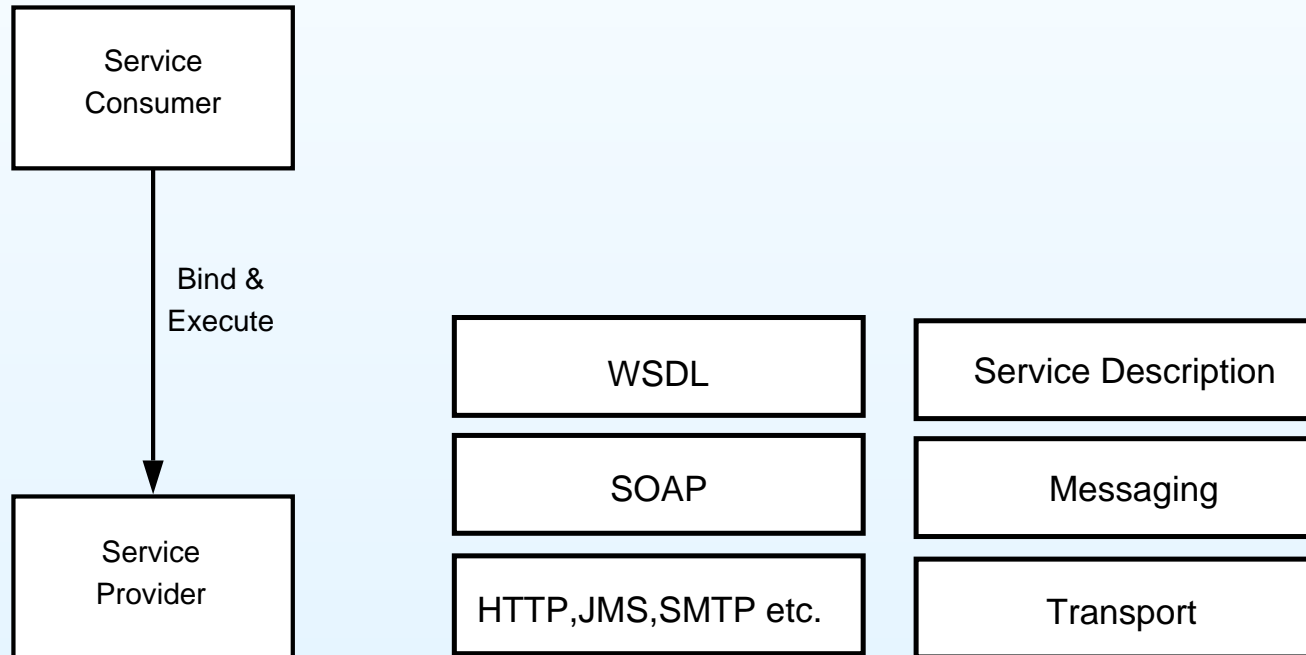
- Find, Bind & Execute Paradigm



- Why Uncontrolled
 - No Control over external services (integrity?)
 - Registry not descriptive enough
- This is the future!

Web Services - Controlled Environment

- Bind & Execute Paradigm
- Standardised Stack
- Used in Enterprise Computing



- This is stable now!

Section III

Applications of Web Services

Applications of Web Services

- Uncontrolled Environments
 - Search - Google Web APIs *
 - Ecommerce - Amazon Web Services (AWS) †
- Controlled Environments
 - Space - NASA Collaborative Information Portal(CIP) ‡
 - Physics - LOFAR Outrigger In Scandinavia(LOIS) §
 - Banking - Sparkassen Informatik GmbH & Co. KG ¶

*<http://www.google.com/apis/>

†<http://www.amazon.com/gp/aws/landing.html>

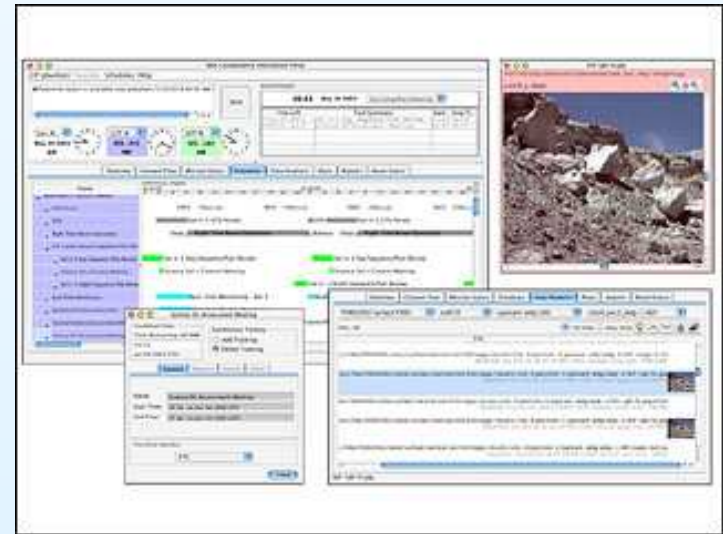
‡E. Sinderson, V. Magapu, R. Mak

§M. Ericsson

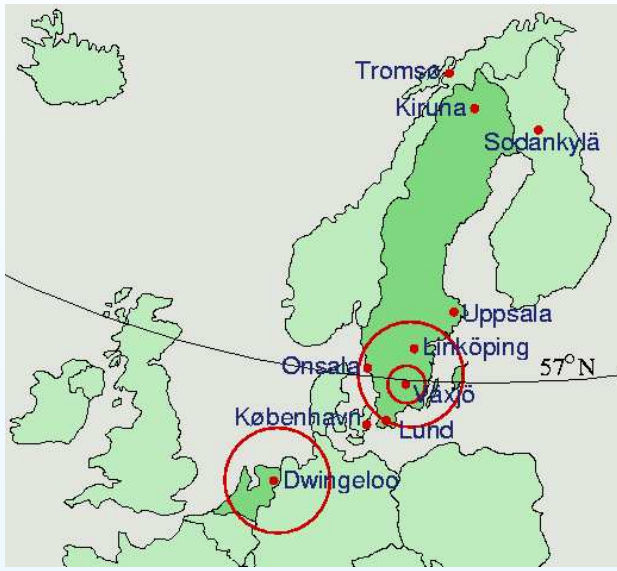
¶O. Zimmermann, S Milinski, M. Craes, F. Oellermann

NASA Collaborative Information Portal

- Information Management System
 - Mission Data, Reports, Images, Schedules, Time
 - 99%+ Availability, 150 Users, Time Constraints
- Solution
 - Client/Server interactions via Web Services
 - Firewall negotiation (Port 80/443)
 - Stateless/Secure (SSL) connections



The LOFAR Outrigger In Scandinavia



- Astrophysics Data Retrieval & Analysis
 - Huge LOFAR datasets (Terrabyte)
 - Open to all researchers
 - Enhance computer science research
- Solution
 - Web Services retrieve data sets to labs
 - Binary XML , LZ77
Compressed XML, Raw SOAP
 - Optimised DOM Parser (lazy evaluation of XML)

Sparkassen Informatik GmbH & Co. KG

- Provides IT Services to 237+ German Banks
 - Hosts Mission Critical Enterprise Applications/Data Stores
 - Heterogeneous front-end landscape
 - Fast, effective and inexpensive integration required
 - Avoid developing middleware infrastructure
 - Sub-Second Performance, 300% Growth, Security
- The Solution
 - SOAP/WSDL interface to IBM Websphere, IBM CICS z/OS
 - No need for UDDI

Section IV

2nd Generation Web Service Technologies

2nd Generation Web Service Technologies

- WS-* Technologies
 - WSCI (Deprecated)
 - WS-CDL
 - BPEL4WS -> WS-BPEL
 - WS-Coordination
 - WS-CF
 - WS-Transaction
 - WS-AtomicTransaction
 - WS-BusinessActivity
 - WS-Security
 - WS-Topology*
 - WS-Interoperability
 - Many more.....

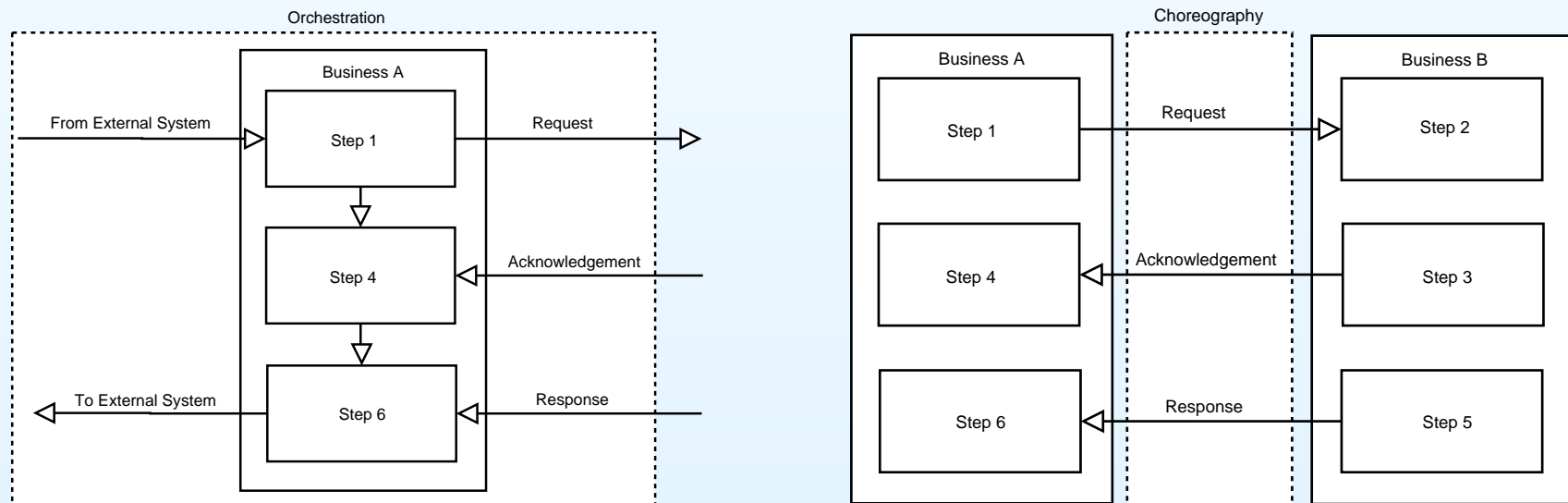
2nd Generation Web Service Technologies

- WS-* Technologies
 - WSCI (Deprecated)
 - **WS-CDL**
 - **BPEL4WS -> WS-BPEL**
 - **WS-Coordination**
 - **WS-CF**
 - WS-Transaction
 - WS-AtomicTransaction
 - WS-BusinessActivity
 - WS-Security
 - **WS-Topology***
 - WS-Interoperability
 - Many more.....

Collaboration

“A collaboration is the high level cooperation of components to achieve some compound novel task. For example a number of Web Services working together to achieve a goal different to their discrete goals may be considered a collaboration.”

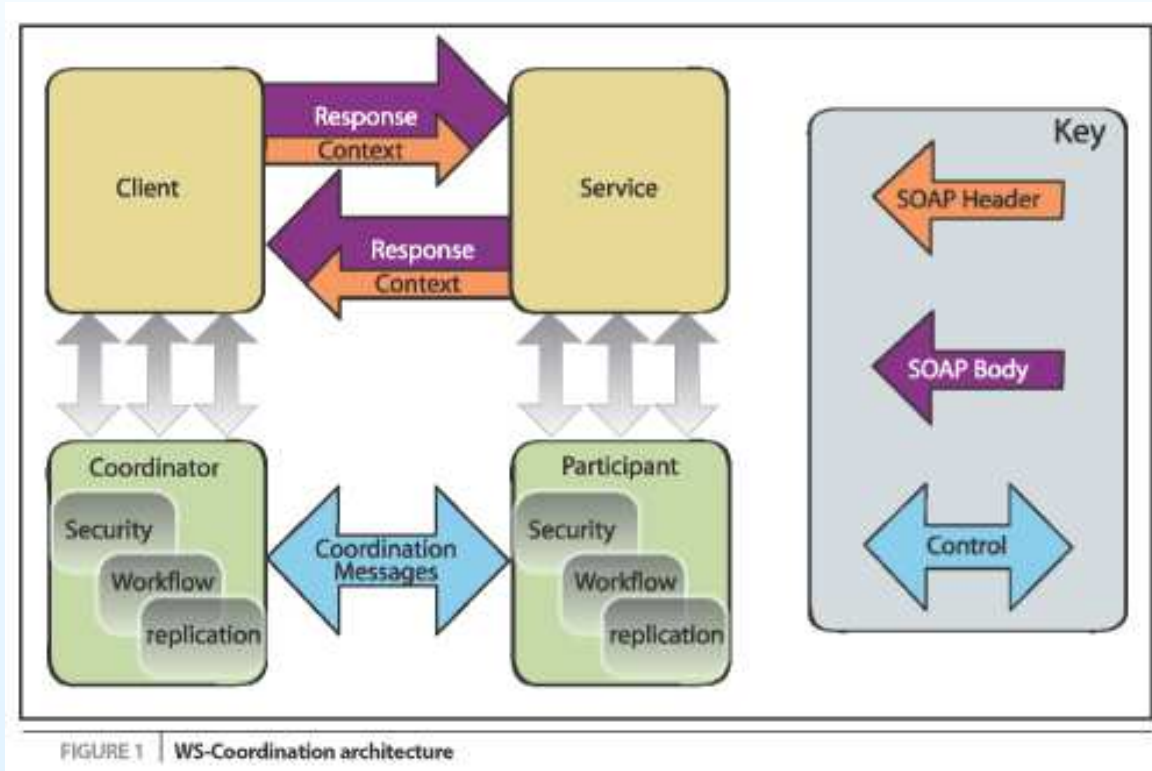
- Orchestration (WS-BPEL) Vs Choreography (WS-CDL)



Coordination

“Coordination is the preservation of the integrity of an activity with regards to it’s context.”

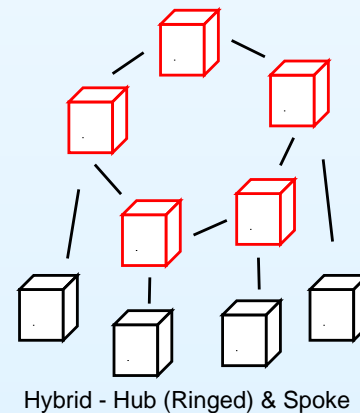
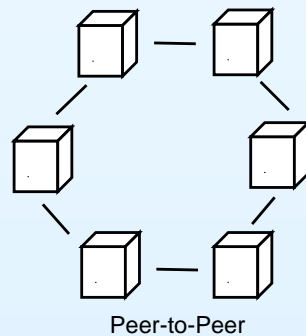
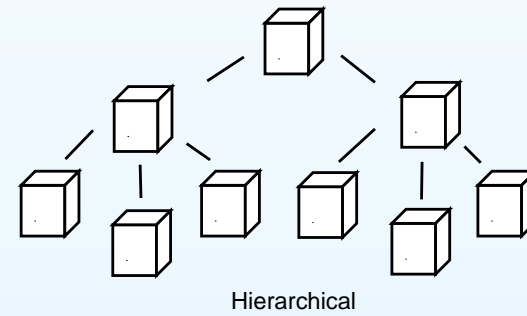
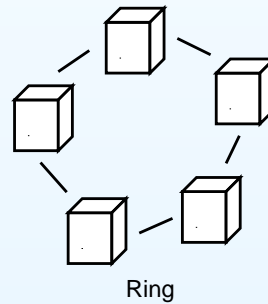
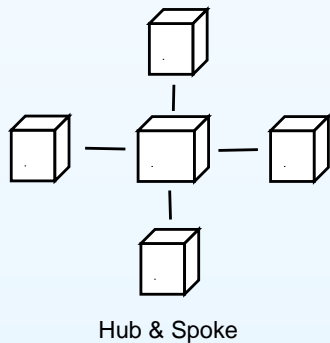
- WS-Coordination Vs WS-CF



Topology

“The layout of the nodes within a distributed system and how they coordinate with each other to ensure a reliable collaboration.”

- WS-Topology



Section IV

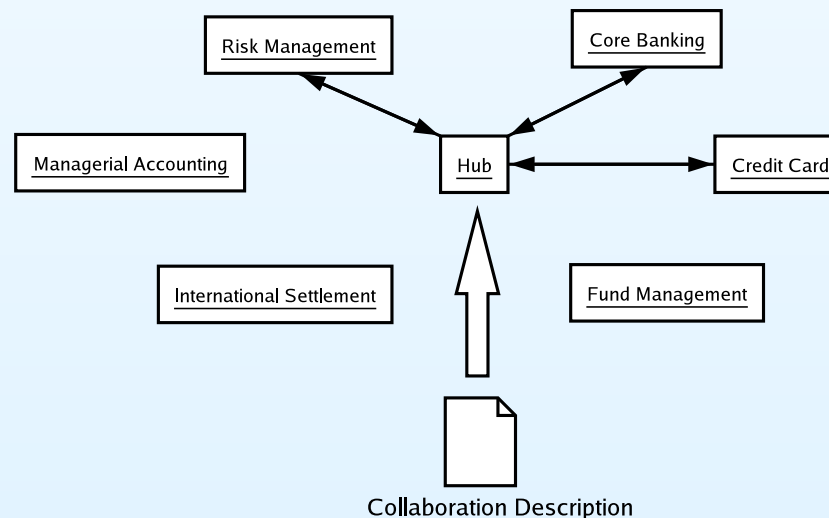
Motivating Case Study

Motivating Case Study

- Bank Sinopac: IBM Case Study
 - Enterprise system
 - Large number of collaborating business processes
 - Expose all the banks services

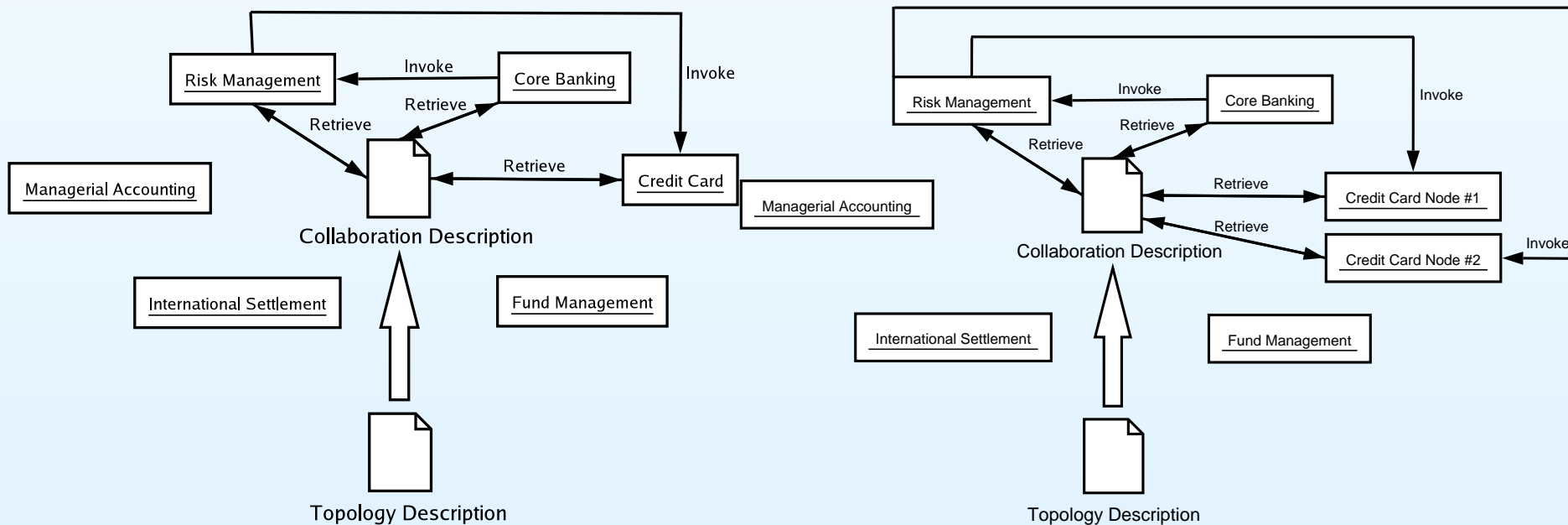
Bank Sinopac

- IBM Solution
 - Integration hub (IBM Websphere Business Integration)
 - Bespoke XML data exchange
- Issues
 - Single point of failure/Bottleneck
 - No flexible/configurable BPM capability
 - 1st generation web services could do this!



Bank Sinopac

- Our Solution
 - Collaboration, Coordination, Topology Management
 - 2nd generation web services can do this!
- Notes
 - No central hub
 - Flexible business processes/connections

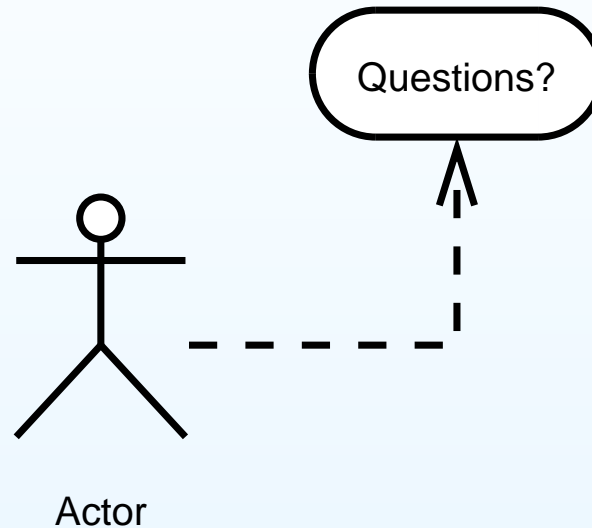


Conclusion

- 1st Generation Web Services - Stable
 - Used in industry
 - Stable stack
 - Excellent interoperability
- 2nd Generation Web Services - Emerging
 - Easy to understand motivation
 - Stack still emerging
 - Future looks promising

Questions

Thanks for listening!



Open Source tools used to make this presentation.....



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