WebServices

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What ARE WebServices?

- Modular applications defined, invoked and found using open standards and XML
- How to **define** a WebService (WSDL)
- How to **invoke** a WebService (SOAP)
- How to **find** a WebService (UDDI)

Why? (Business requirements)

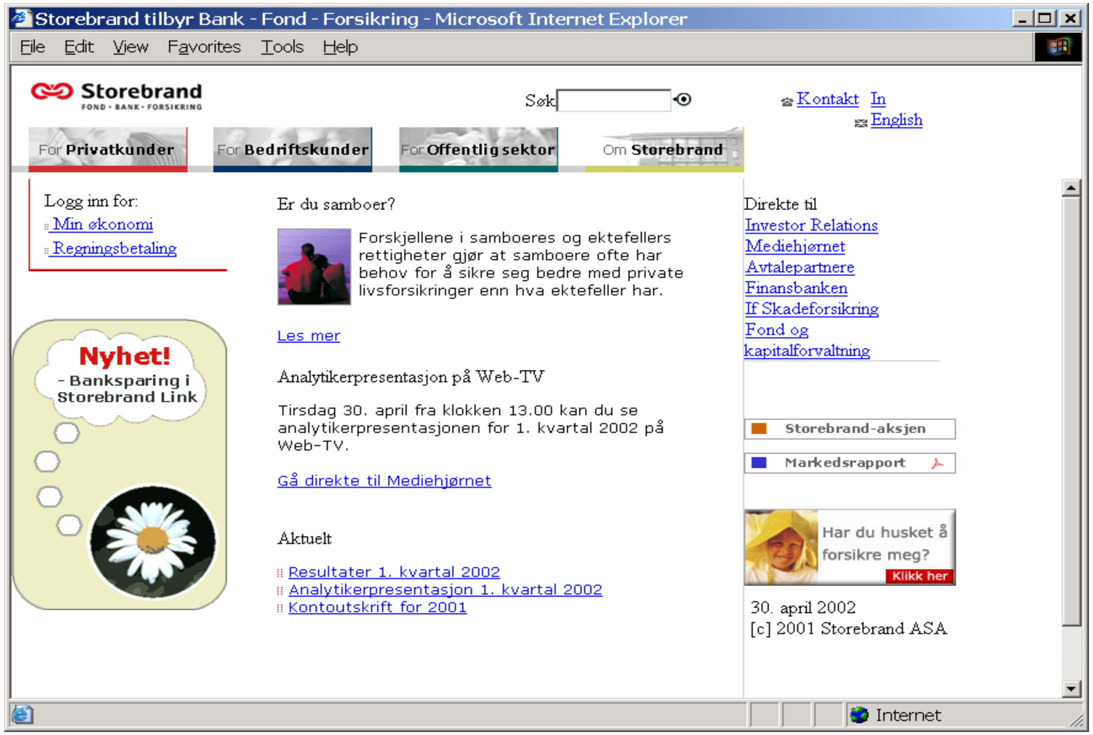
- Mergers, de-mergers, partnerships, marketplaces, supply chains
- Combine and re-use resources, systems, and data
  - From different technologies, departments, companies
  - To build new products & services
- Fast, flexible, non-disruptive
- Low cost to get started
- Available skills

How? (Standards)

- Architectural blueprint
- Open standards
- “Lingua Franca” for communications and integration
- Tools to get at existing systems
- Composition, flow, process management
- Decoupled
  - Standardised or described interfaces
- Ability to specify required quality of service
  - Performance, SLA, security, responsiveness

Storebrand example

- 390,000 employees in 6,500 companies have a Storebrand pension
- Updates by mail, fax or file transfer
- Now payroll systems connect directly to Storebrand over WebServices
- jStart project developed first WebService in days



Logg inn for:
Min økonomi
Regningsbetaling

Nyhet!
- Banksparing i Storebrand Link

Er du samboer?

Forskjellene i samboeres og ektefellers rettigheter gjør at samboere ofte har behov for å sikre seg bedre med private livsforsikringer enn hva ektefeller har.

Les mer

Analytikerpresentasjon på Web-TV

Tirsdag 30. april fra klokken 13.00 kan du se analytikerpresentasjonen for 1. kvartal 2002 på Web-TV.

Gå direkte til Mediehjørnet

Aktuelt

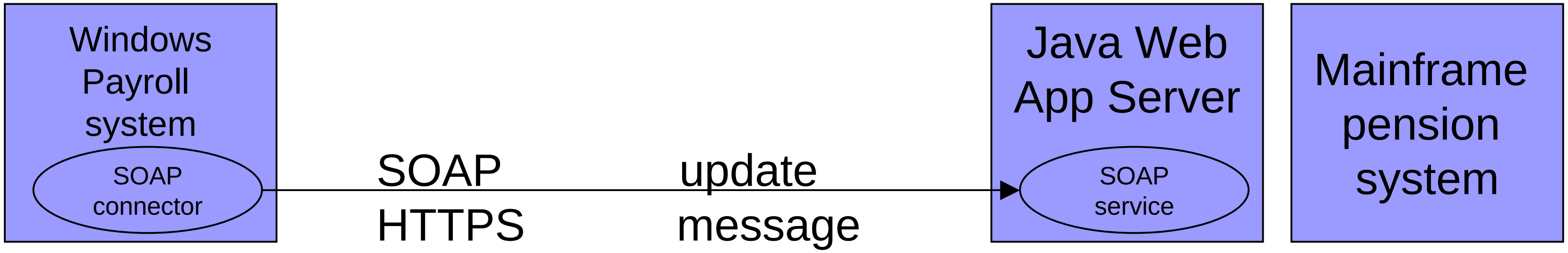
- Resultater 1. kvartal 2002
- Analytikerpresentasjon 1. kvartal 2002
- Kontoutskrift for 2001

Direkte til
Investor Relations
Mediehjørnet
Avtalepartnere
Finansbanken
If Skadeforsikring
Fond og kapitalforvaltning

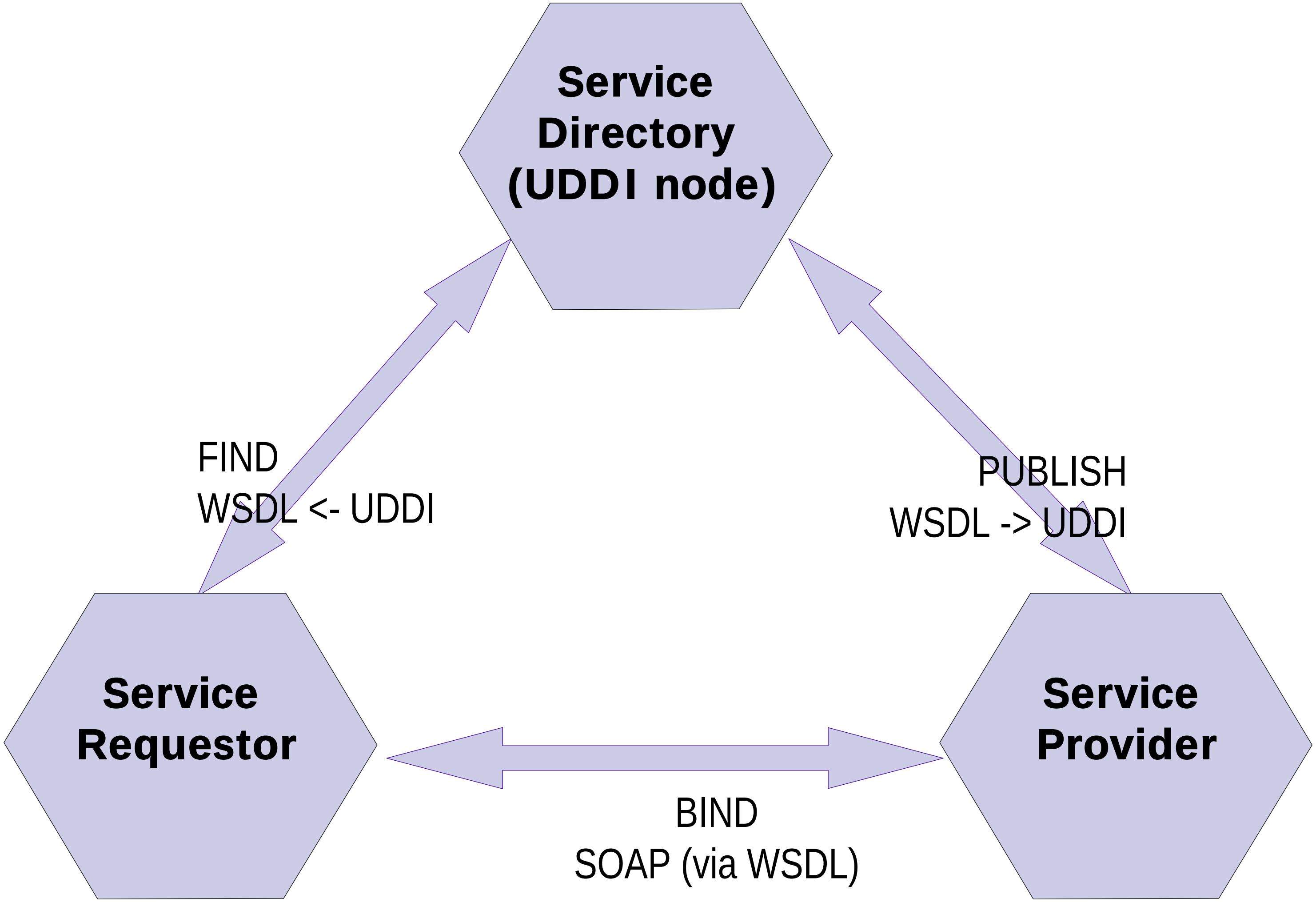
Storebrand-aksjen
Markedsrapport

Har du husket å forsikre meg?
Klikk her

30. april 2002
[c] 2001 Storebrand ASA


Windows Payroll system
SOAP connector
SOAP HTTPS
update message
Java Web App Server
SOAP service
Mainframe pension system

Service Oriented Architecture



Service Directory (UDDI node)

Service Requestor

Service Provider

FIND
WSDL <- UDDI

PUBLISH
WSDL -> UDDI

BIND
SOAP (via WSDL)

SOAP

- **S**imple **O**bject **A**ccess **P**rotocol
- An XML messaging format
- Language independent
- Extensible
  - Bindings
  - Data
- SOAP being developed as a W3C standard

A SOAP Message

```
<SOAP-ENV:Envelope>
  xmlns:SOAP-ENV="http://{soaporg}/envelope/"
  SOAP-ENV:encodingStyle=
       "http://{soaporg}/encoding/">

   <SOAP-ENV:Body>
       <m:GetLastTradePrice xmlns:m="Some-URI">
           <symbol>IBM</symbol>
       </m:GetLastTradePrice>
   </SOAP-ENV:Body>

</SOAP-ENV:Envelope>
```

SOAP Messaging Model

- Fundamentally one-way messages
  - sequences can be combined for request/response etc.
- Defines a message path for routing messages
  - Receiver looks at message and processes it and replies or whatever

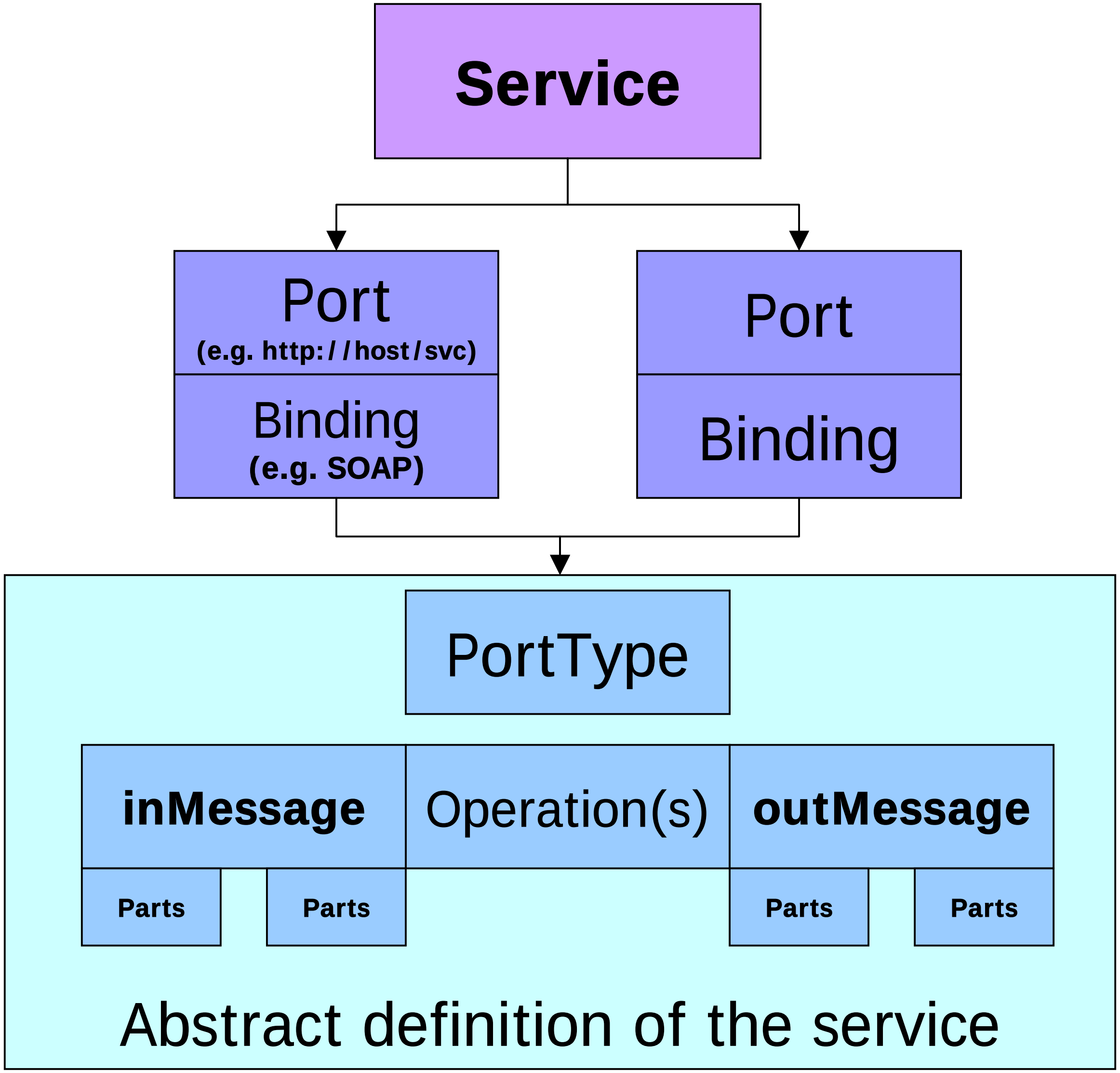
SOAP runtime

- Apache SOAP toolkit
  - Download from http://xml.apache.org
  - Servlet
  - Uses a SOAPMappingRegistry to parse incoming messages
  - PluggableProviders can call JavaBeans, Scripts, **EJBs**, and .NET objects
- Apache Axis is the next revision

WSDL details

- Three aspects:
  - PortTypes (interface)
    - Abstract descriptions of services
  - Bindings
    - The linkage to a “real” implementation – e.g. SOAP
  - Port (endpoint)
    - The address of the actual service endpoint

WSDL graphically



PortTypes

- A PortType exposes a set of Operations
- An operation sees a Message
- A message is a set of named Parts
- A Part is either:
  - An abstract typed object – described in XSD
  - An XML Element – described in XSD

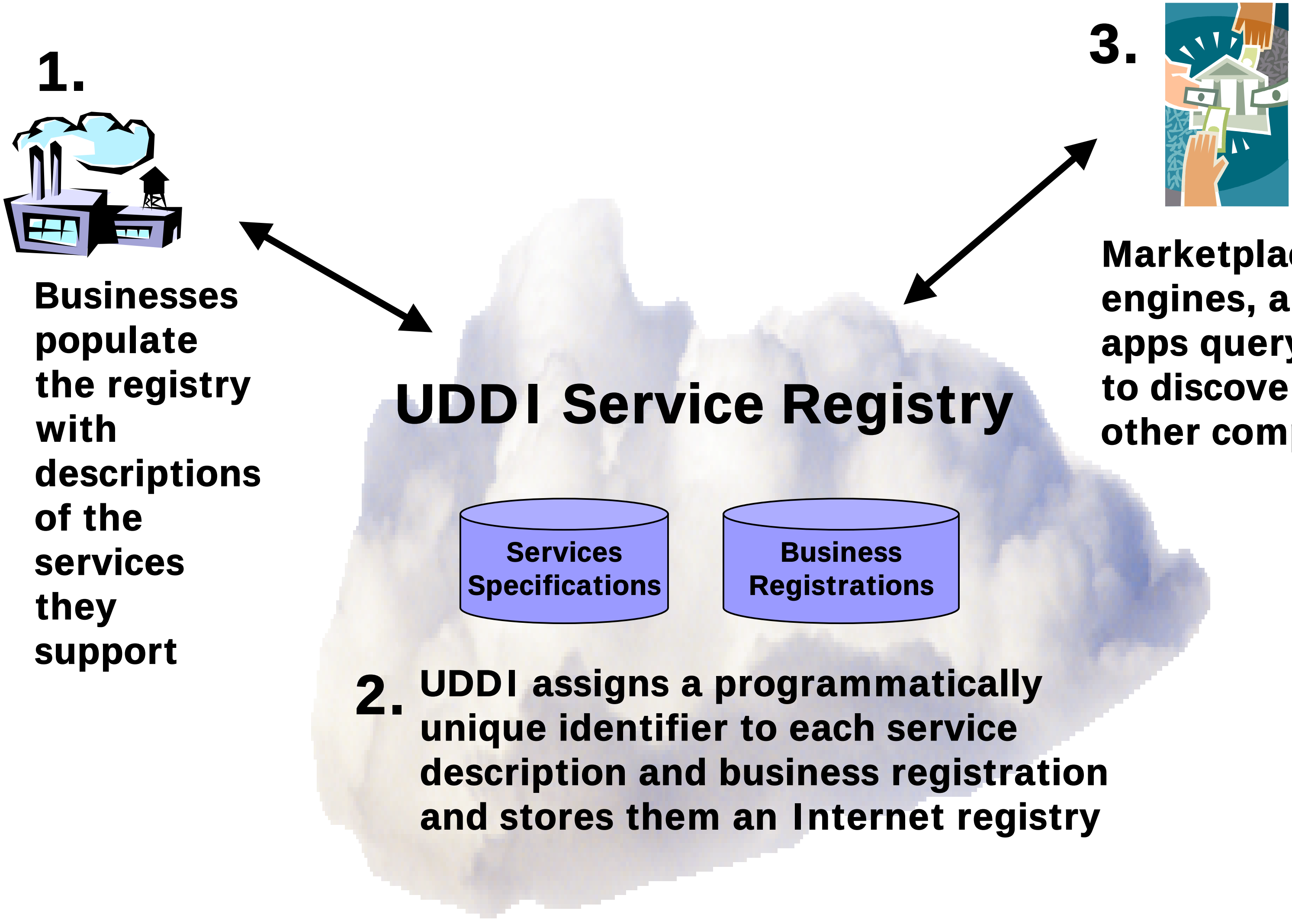
Bindings

- Bindings specify how to expose a PortType as a real service
  - Allow extensibility elements that describe:
    - How the binding maps to the protocol
- Bindings are exposed at runtime through a Port
- A set of ports is a Service

What is UDDI?

- An architecture for WebServices
  - Standards-based specifications for service **description** and **discovery**
  - Shared operation across multiple implementations
- Partnership among industry leaders, starting with Ariba, HP, IBM, and Microsoft

How UDDI v1 Works



1. Businesses populate the registry with descriptions of the services they support

UDDI Service Registry

Services Specifications

Business Registrations

2. UDDI assigns a programmatically unique identifier to each service description and business registration and stores them an Internet registry

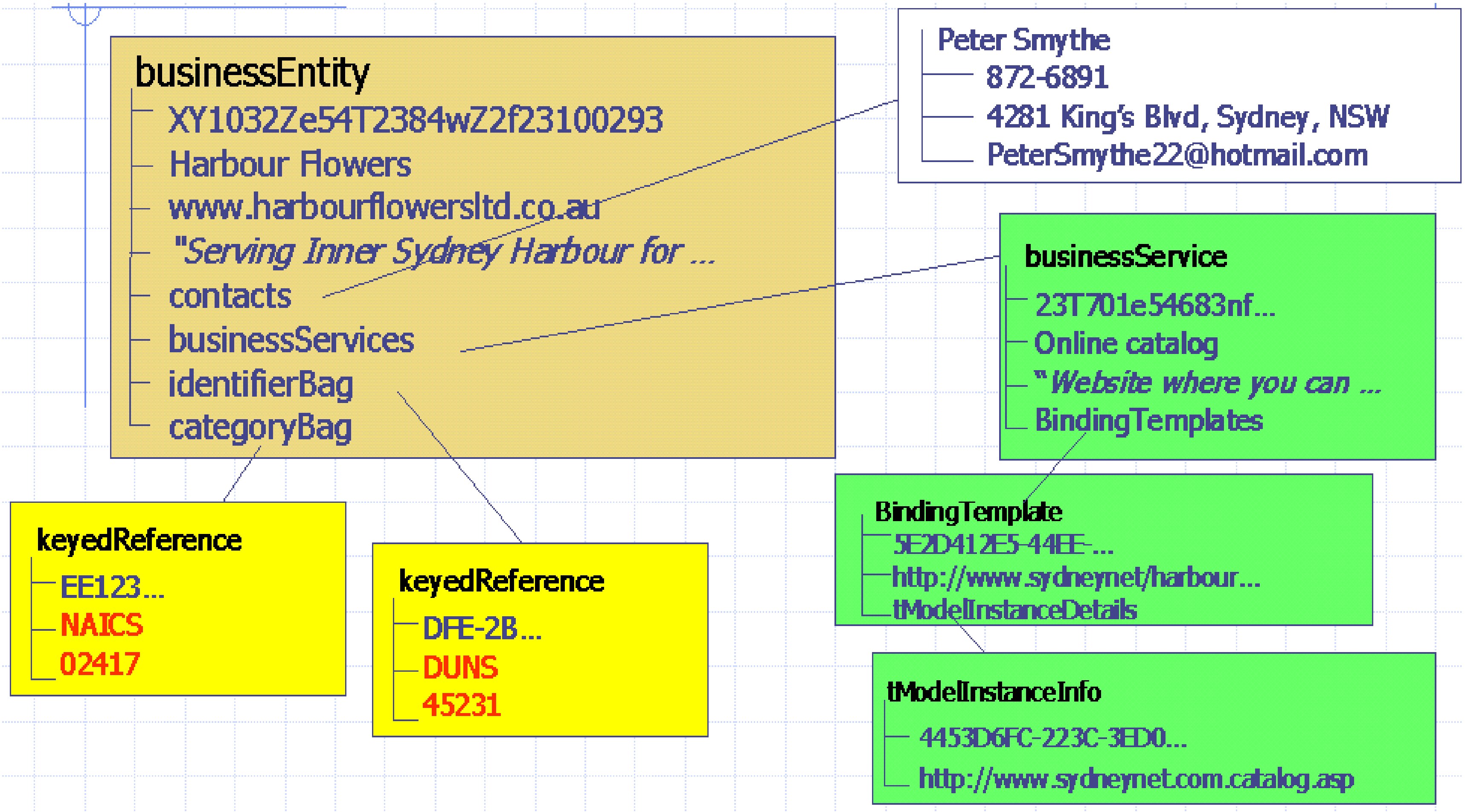
3. Marketplaces, search engines, and business apps query the registry to discover services at other companies

UDDI: What's in the registry?

- White Pages
  - Address, contact, and identifiers
- Yellow Pages
  - Industrial categorizations based on standard taxonomies
- Green Pages
  - Technical information about services that are exposed by the business

UDDI

Universal Discovery Description and Integration



businessEntity
- XY1032Ze54T2384wZ2f23100293
- Harbour Flowers
- www.harbourflowersltd.co.au
- *"Serving Inner Sydney Harbour for …*
- contacts
- businessServices
- identifierBag
- categoryBag

Peter Smythe
- 872-6891
- 4281 King's Blvd, Sydney, NSW
- PeterSmythe22@hotmail.com

businessService
- 23T701e54683nf…
- Online catalog
- *"Website where you can …*
- BindingTemplates

keyedReference
- EE123…
- NAICS
- 02417

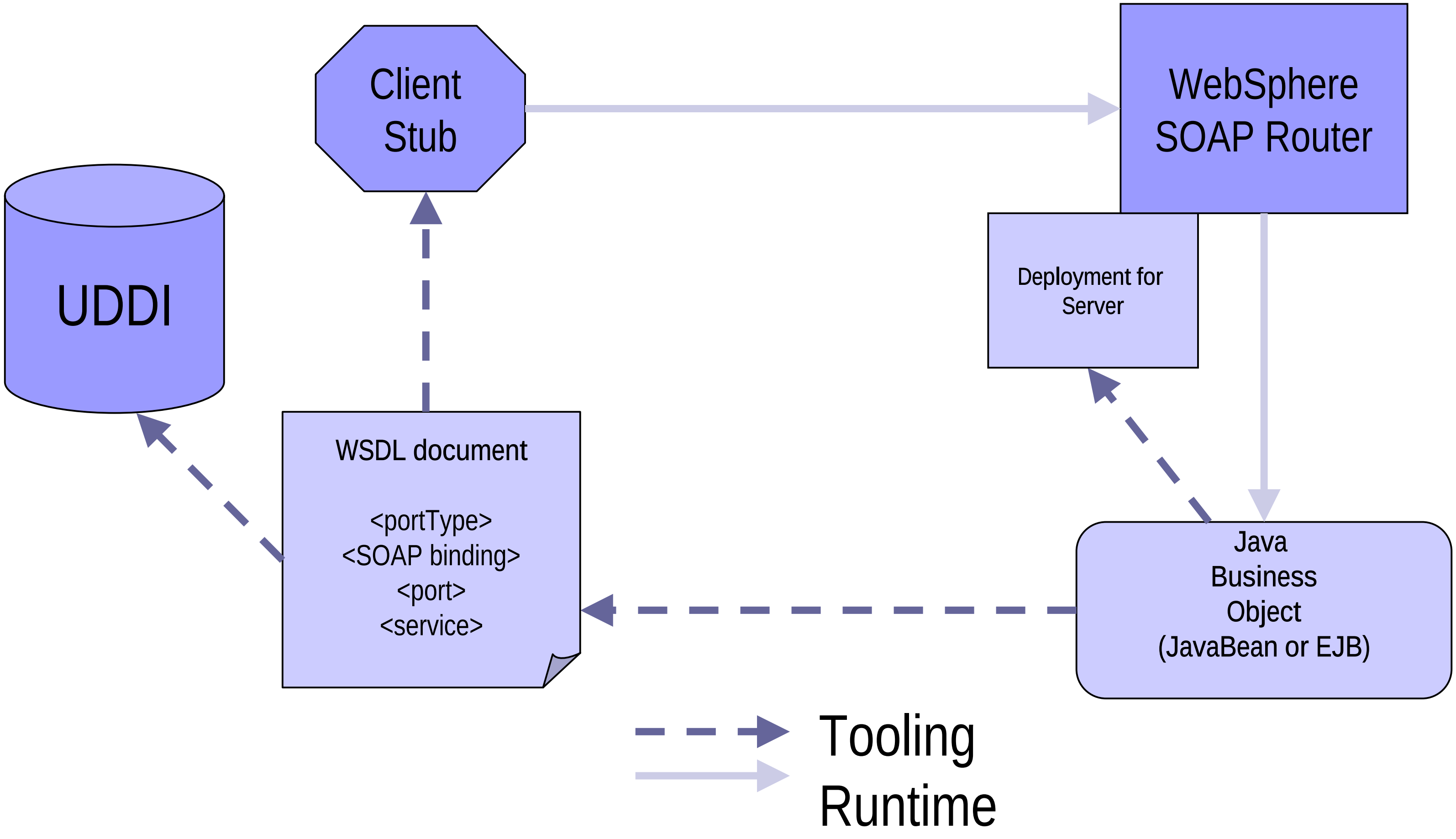
keyedReference
- DFE-2B…
- DUNS
- 45231

BindingTemplate
- 5E2D412E5-44EE-…
- http://www.sydneynet/harbour…
- tModelInstanceDetails

tModelInstanceInfo
- 4453D6FC-223C-3ED0…
- http://www.sydneynet.com.catalog.asp

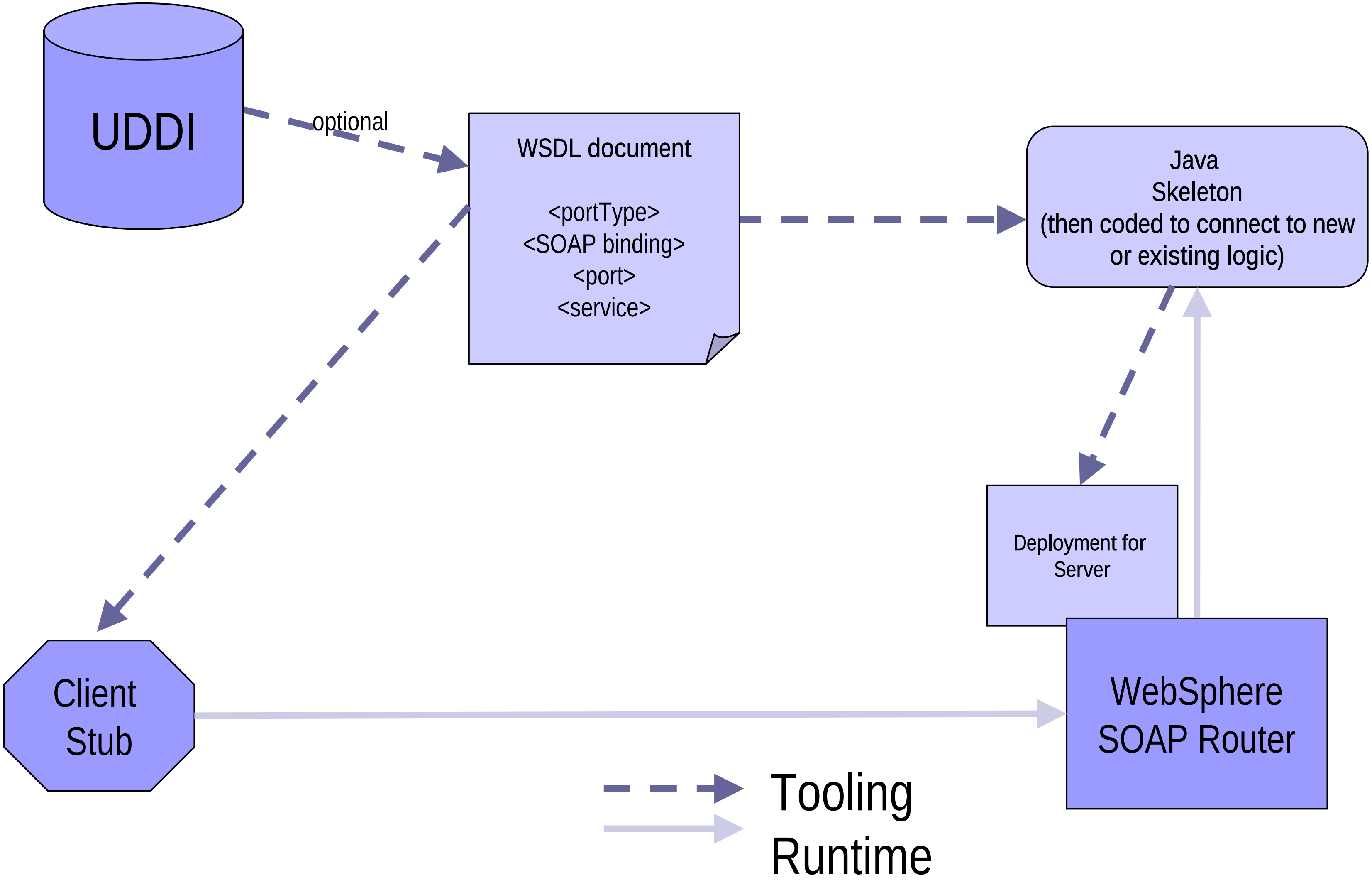
Building a WebService

bottom up



Building a WebService

top down



WebServices today

- SOAP, WSDL and UDDI
  - A core platform
  - Stable – with 2nd/3rd generation code
- The future?
  - “Is it secure?”
  - “What about performance?”
  - “How do I deal with unreliability?”

WS-Security

- Moves authentication, encryption and signature
  - from transport (e.g. HTTPS)
  - to SOAP level
    - UserID/Password, Kerberos tokens, Certificates
    - Body and element level encryption
    - Digital Signatures
- Allows multi-hop scenarios
- Interoperability Tests have been performed in public
- Now part of IBM WebSphere product set

Transactions and Co-ordination

- Two phase commit is restricted to specialised tightly-coupled environments
- Compensation is a better model for loosely coupled environments
  - No locks held
  - Long running transactions possible
  - Difference between
    - rollback to previous state
    - compensate by an equal and opposite transaction
- `WS-Transaction/WS-Coordination` specifications

Reliability

- A number of proposals
  - ebXML has a reliable messaging framework
  - WS-Reliability been proposed by a group of companies
  - BEA has also published some proposals
- New OASIS Web Services Reliable Messaging (WSRM) technical committee formed
  - http://www.oasis-open.org/committees/wsrm/

WS-Policy Framework

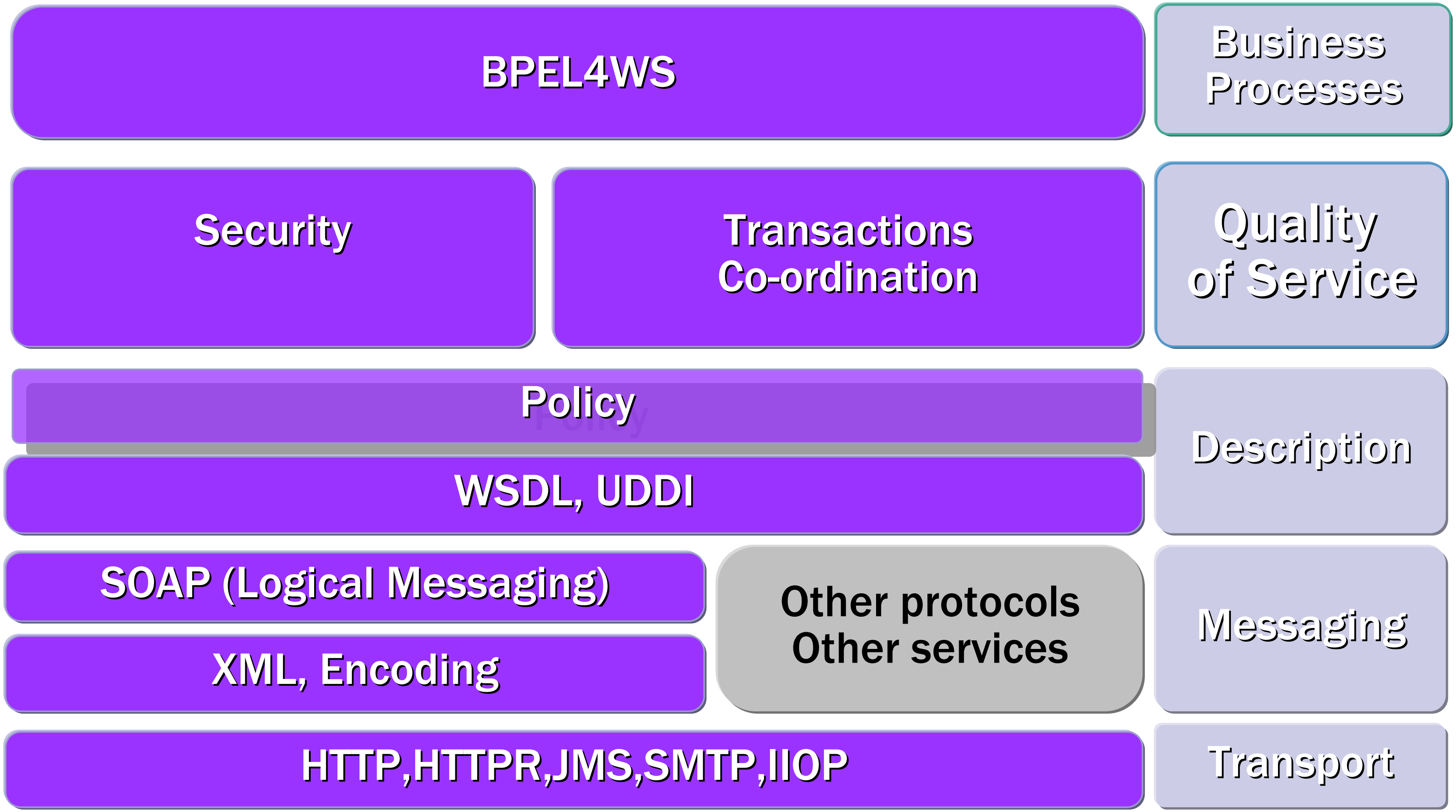
- A joint proposal from:
  - IBM, Microsoft, BEA and SAP
- Allowing the description and publication of:
  - Capabilities
  - Requirements
- Allows *Quality of Service* to be described and published
- Domain specific specifications build on this:
  - `WS-SecurityPolicy`
  - `WS-TransactionPolicy`

WS-Policy in one slide

- *Assertion*
  - An individual capability, requirement
  - Defined by extension specifications, e.g. `Confidentiality` assertion in `WS-SecurityPolicy`
- Assertions are grouped into *Statements*
  - e.g.

    ```
    <wsp:OneOrMore>
            <assertion1>
            <assertion2>
    </wsp:OneOrMore>
    ```
- Policy *Attachment* defines how to link from
  - A WSDL document or UDDI entry to a policy
  - Specified in `WS-PolicyAttachment` specification

Web Services Architecture and Standards



A few resources

- Apache WebServices project (inc. Axis)
  - http://ws.apache.org
- Web Services Toolkit
  - www.alphaworks.ibm.com/tech/webservicestoolkit
- developerWorks WebServices Zone
  - www.ibm.com/developerworks