



UDDI

Universal Discovery, Description and Integration

Bob Brown

t r a n s e n t i a

bob@transentia.com.au

<http://www.transentia.com.au>

What is UDDI?

- Universal Description, Discovery and Integration
 - *“A common set of SOAP APIs that enable the implementation of a service broker”*
 - *“The power of UDDI is the power of ad-hoc discovery of new business partners and processes....UDDI lets companies do three things:*
 - *Discover each other;*
 - *Define how they can interact via the Internet; and*
 - *Share all this information via an open, global registry.”*
 - *“...a specification for distributed web-based information registries of Web Services. UDDI is also a publicly accessible set of implementations of the specification that allow businesses to register information about the Web Services they offer so that other businesses can find them.*

Web Services are the next step in the evolution of the World Wide Web (WWW) and allow programmable elements to be placed on web sites where other can access distributed behaviors. UDDI registries are used to promote and discover these distributed Web Services.”

Interop Stack	Universal Service Interop Protocols (these layers are not defined yet)
	Universal Discovery, Discription, Integration (UDDI)
	Simple Open Access Protocol (SOAP)
	Extended Markup Language (XML)
	Common Internet Protocols (HTTP, TCP/IP)

- Over 220 companies are members of the UDDI community:
 - IBM, Microsoft and Ariba
 - Main originators
 - Also behind SOAP/WebServices
 - So no surprise
 - HP, Boeing, British Telecommunications, Accenture, Cargill, Clarus, CommerceOne, Compaq, Dell, I2, ICG, Rational, Sabre, SAP, Sun, Tibco, WebMethods
 - All see it as a major step forward
 - Many of the companies involved in the project hope to build more specific directories on top of UDDI
 - Microsoft, IBM, and HP will maintain the servers that collect the registry information for about the next year, at which time the project will be turned over to an as-yet unnamed standards body
 - Microsoft has enabled RealNames Keywords as a UDDI identifier for companies/products/services throughout its UDDI registry site
 - *“a flower shop in Australia might take advantage of UDDI by discovering new tulip suppliers in Holland.”*
- Now being overseen by OASIS group
- Now at version 3 of the spec; version 2 in use

- *“The UDDI standard is intended to provide central directories where consumers of Web services can access various services, either within a company's firewall, via an extranet, or on the public Internet. Service providers can register them and make them available via UDDI, which is based on technologies such as XML, HTTP, and DNS.”*
 - Paul Krill, Infoworld
- *“The true power of UDDI will come when development tools automatically create the WDSL files to describe newly-created apps and delivers them seamlessly to the public UDDI databases.”*
 - InternetWeek June 7, 2001
- *‘UDDI is a “next layer” in an emerging stack enabling rich Web Services. UDDI uses standards-based technologies such as TCP/IP, HTTP, XML and SOAP to create a uniform service description format and service discovery protocol.’*
 - UDDI.org Technical white paper

Quotes...

- *‘Unfortunately, enthusiasm for UDDI has dampened considerably since the standard’s creation a couple of years ago. “UDDI has basically fallen off the radarscope of most organizations looking to implement more advanced forms of business-to-business functionality”’—Ken Vollmer, Giga Information Group*
- *“We expect internal use of UDDI for services-oriented architecture to be big, important, and a very cool enabler of Web services.”—Ted Schadler, Forrester’s group*
- *“...whoomph! all your clients disappear with their next UDDI service look-up. Seems a risky proposition to me.”*
- *“As usually described, the trinity of Web services technologies includes SOAP for invoking remote operations, WSDL for specifying what those operations look like, and UDDI for . . . well, what, exactly? What is UDDI actually good for?”—*
http://www.chappellassoc.com/articles/article_who_cares_UDDI.html

- Problems the UDDI specification can help to solve:
 - Making it possible for organizations to quickly discover the right business from millions currently online
 - Defining how to enable commerce to be conducted once the preferred business is discovered
- Immediate benefits include:
 - Reaching new customers
 - Expanding offerings
 - Extending market reach
 - Increasing access to current customers
 - Solving customer-driven need to remove barriers to allow for rapid participation in the global Internet economy
 - Describing their services and business processes programmatically in a single, open, and secure environment
 - Using a set of protocols that enable businesses to invoke services over the Internet to provide additional value to their preferred customers.

“In the long run, UDDI's evolution may well absorb LDAP into a new standard for directory services. At least, that appears to be the aim of Sun's efforts.”

http://www.infoworld.com/article/02/05/31/020603seuddi_1.html

Who Will Use UDDI?

- **Businesses of all sizes**
- **A sampling:**
 - **Large Organizations**
 - Global 2000, Fortune 500, large manufacturers with hundreds of suppliers, national financial institutions, healthcare providers, etc.
 - **Small / medium enterprises**
 - Regional distributor, services / consulting firm, local retailer of goods and services, small sporting goods shop, etc.
 - **Independent Software Vendors (ISVs) and integrators**
 - ERP vendors, networking companies, Big-5 consulting firms, local software houses, etc.
 - **Marketplace creators**
 - Net Market Makers, horizontal Marketplaces, Corporate Exchanges, etc.
 - **Industry and standards organizations**
 - IT standards bodies and industry vertical organizations and associations.

Who Will Manage UDDI?

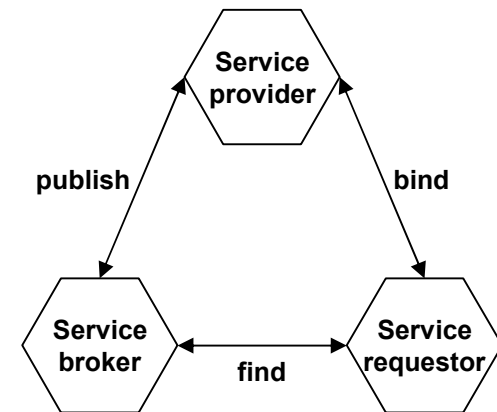
- All the big names *hope* to!
 - “*who controls the registry, controls the industry*”
- Others too...
 - NTT launched Asia's first on October 9, 2002
 - <http://www.ntt.com/uddi/>



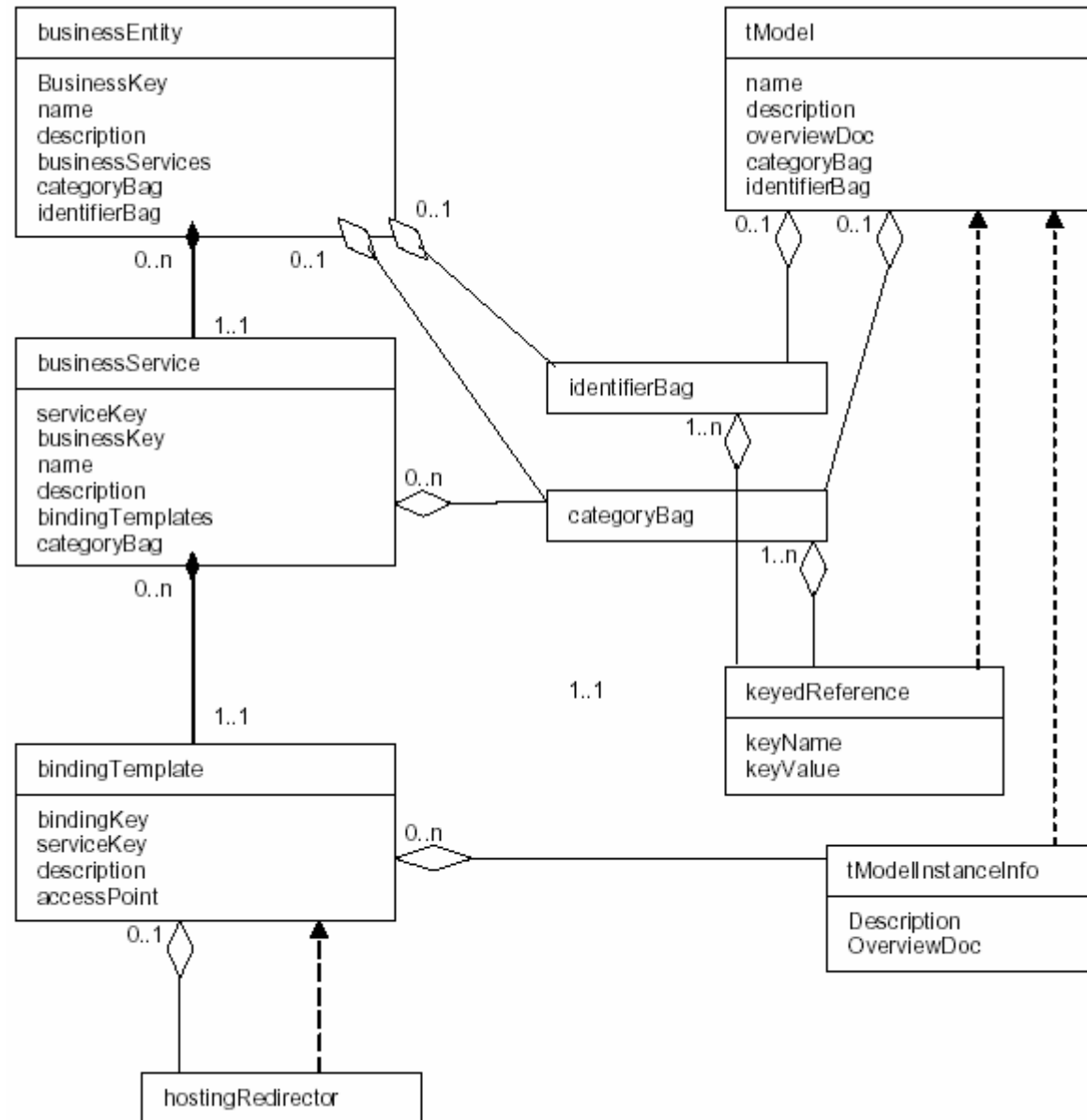
Operator node	Inquiry URL	Publishing URL
HP	http://uddi.hp.com/inquire	https://uddi.hp.com/publish
IBM Production	http://www-3.ibm.com/services/uddi/inquiryapi	https://www-3.ibm.com/services/uddi/protect/publishapi
IBM Test	http://www-3.ibm.com/services/uddi/testregistry/inquiryapi	https://www-3.ibm.com/services/uddi/testregistry/protect/publishapi
Microsoft Production	http://uddi.microsoft.com/inquire	https://uddi.microsoft.com/publish
Microsoft Test	http://test.uddi.microsoft.com/inquire	https://test.uddi.microsoft.com/publish
SAP Test	http://udditest.sap.com/UDDI/api/inquiry/	https://udditest.sap.com/UDDI/api/publish/
Systinet	http://www.systinet.com/wasp/uddi/inquiry/	https://www.systinet.com/wasp/uddi/publishing/

<http://www.oreilly.com/catalog/javawebsevr/chapter/ch06.html?CMP=IL7015>

- Consists of:
 - An XML schema for SOAP messages
 - Defines three core types of information that provide the kinds of information that a technical person would need to know in order to use a partner's WebServices, plus metadata:
 - businessEntity element
 - » businessEntity structures contain all information about advertised WebServices
 - » includes support for “yellow pages” interaction
 - businessService and bindingTemplate elements
 - » Service and binding information supports “green pages” service for working with live data
 - (Meta)Information about services
 - » Held in “tModels” (technical models), this information is metadata about a service, including its name, publishing organization, and URL pointers to the actual specifications themselves
 - A description of the UDDI API specification
 - Divided into two logical parts:
 - Inquiry API
 - » *find_xx* and *get_xx* calls
 - Publishers' API
 - » *save_xx* and *delete_xx* functions



Info. Model...



Simple Java Find Example

```
import ...;

public class FindBusinessExample {
    public static void main (String args[]) {
        System.setProperty("java.protocol.handler.pkgs", "com.sun.net.ssl.internal.www.protocol");
        java.security.Security.addProvider(new com.sun.net.ssl.internal.ssl.Provider());
        new FindBusinessExample().run();
        System.exit(0);
    }
    public void run() {
        // Construct a UDDIProxy object. Enables SSL support
        UDDIProxy proxy = new UDDIProxy();
        try {
            proxy.setInquiryURL("http://www-3.ibm.com/services/uddi/testregistry/inquiryapi");
            // Find businesses who's name starts with S
            BusinessList bl = proxy.find_business("S", null, 0);
            Vector businessInfoVector = bl.getBusinessInfos().getBusinessInfoVector();
            for (int i = 0; i < businessInfoVector.size(); i++) {
                BusinessInfo businessInfo = (BusinessInfo)businessInfoVector.elementAt(i);
                System.out.println(businessInfo.getNameString());
            }
            // Handle possible errors
        } catch (UDDIException e) {
            DispositionReport dr = e.getDispositionReport();
            if (dr!=null) {
                System.err.println("UDDIException faultCode:" + e.getFaultCode() +
                                   "\n operator:" + dr.getOperator() +
                                   "\n generic:" + dr.getGeneric() +
                                   "\n errno:" + dr.getErrno() +
                                   "\n errorCode:" + dr.getErrCode() +
                                   "\n errInfoText:" + dr.getErrInfoText());
            }
            e.printStackTrace(System.err);
            // Catch any other exception that may occur
        } catch (Exception e) {
            e.printStackTrace(System.err);
        }
    }
}
```

- Search for businesses named “Acme, Inc.”

```
'// Declare the objects from the UDDI SDK
Dim req As New UDDIEnv.RequestManager ' the request manager
Dim env As New UDDIEnv.Envelope       ' for our request
Dim respEnv As UDDIEnv.Envelope       ' for our response
Dim inqMsg As New UDDI10.find_business ' Request Doc Object
Dim inqRsp As New UDDI10.businessList ' Response Doc Object
Dim result As UDDI10.businessInfo     ' iterator

'// Set up the request document with the request envelope
Set env.Plugin = inqMsg

'// Set our search criteria
inqMsg.Name = "Acme Inc."

'// Send the request, and get back the response envelope
Set respEnv = req.UDDIRequest(env)

'// Add the document object to the envelope to read the response
Set respEnv.Plugin = inqRsp

'// Loop through the results
For Each result In inqRsp.businessInfos
    Debug.Print result.Name
Next
```

- XML-based interactions

```
<?xml version="1.0" encoding="UTF-8"?>
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <find_business xmlns="urn:uddi-org:api" generic="1.0" maxRows="100">
      <name>Acme Inc.</name>
    </find_business>
  </Body>
</Envelope>
```



Send

```
<?xml version="1.0" encoding="utf-8"?>
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <businessList generic="1.0" operator="Microsoft Corporation" truncated="false"
      xmlns="urn:uddi-org:api">
      <businessInfos>
        <businessInfo businessKey="01A3C678-C135-40A1-BB1F-F5B9351BA39C">
          <name>Acme Inc.</name>
          <description xml:lang="en">Industrial Supplier</description>
          <serviceInfos>
            <serviceInfo serviceKey="1EE822F6-EC50-448C-9447-300352F4F1C0">
              <name>Catalog</name>
            </serviceInfo>
            <serviceInfo serviceKey="E74C1108-6CF9-419A-85B3-38CADDB61713">
              <name>Purchasing</name>
            </serviceInfo>
          </serviceInfos>
        </businessInfo>
      </businessInfos>
    </businessList>
  </Body>
</Envelope>
```



Return

VB Publish Example

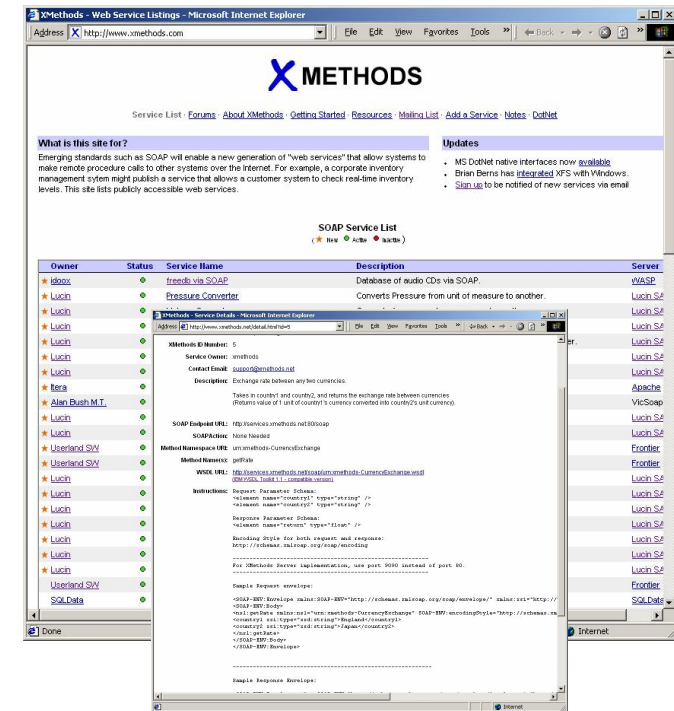
```
Dim be As New save_business
Dim bd As New businessDetail
Dim env As New UDDIEnv.Envelope
Dim ret As UDDIEnv.Envelope
Dim req as new UDDIEnv.requestManager

Req.authenticate "MyUserID", "MyPassword"

Set env.Plugin = be
With be.AddbusinessEntity
    .Name = "Contoso Manufacturing"
    .Adddescription = "We make components for business"
    With .businessServices.AddbusinessService
        .Name = "Buy components"
        .Adddescription = "Bindings for buying our components"
        With .bindingTemplates.AddbindingTemplate
            .accessPoint = "http://www.contoso.com/buy.asp"
            .addescription = "BASDA invoices over HTTP post"
            With .tModelInstanceDetails.AddtModelInstanceInfo
                .tModelKey = GUID_BASDA_INVOICE
            End With
        End With
    End With
End With
Set ret = req.UDDIRequest(env)
If req.UDDIErrno = 0 Then
    Set ret.Plugin = bd
    Debug.print bd.businessEntity.businessKey
End If
```


- Fairly vague statements made...the gist is:
 - Key operating principal: only allow authorized individuals to publish or change information
 - Changes and deletions are only allowed if a change request (via API call) is made by the same individual registered as being the one that originally created the effected information
 - Each instance of a UDDI business registry, called an Operator Site, is allowed to define its own end user authentication mechanism
 - All UDDI Operator Sites are required to meet certain minimum criteria that provide similar security protections

- The UDDI registry will contain three types of information:
 - *White Pages*: business names, descriptions of the type of business, what kind of services a vendor uses and what protocols they support
 - *Yellow Pages*: adopt current government codes for tagging types of business operations as well as various naming protocols
 - Also arranges companies by geographical location
 - *Green Pages*: provide dynamic information on what types of documents a company can receive, the entry points for transactions, and the technology they currently interact with and support
- Companies involved in the project hope to build more specific directories on top of UDDI
 - An open, common starting point with consistent identifiers for companies' business practices
 - vendors can offer other services on top of the directory which could allow them to generate additional revenue



- ...are a'coming
 - Sun's JAX-R (Java API for XML Registries) looks to be important
 - Provides facilities on top of 'plain' UDDI/MOF/...

```
public void findOrganizations() throws JAXRException {
    // Search criteria -- Organizations found will return in this sort order
    Collection findQualifiers = new ArrayList();
    findQualifiers.add(FindQualifier.SORT_BY_NAME_DESC);

    // Query the JAXR taxonomy service
    ClassificationScheme
        naics = businessQueryManager.findClassificationSchemeByName(findQualifiers, "ntis-gov:naics:1997");

    // Create the classification that will be a parameter to findOrganization() method
    Classification computerSystemsDesign =
        businessLifeCycleManager.createClassification(naics,
                                                    "Computer Systems Design and Related Services",
                                                    "5415");

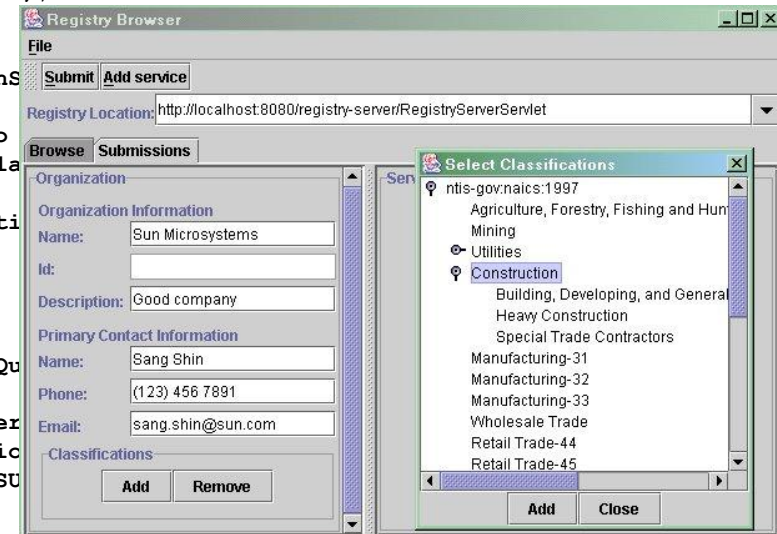
    // Query the taxonomy service
    ClassificationScheme
        geography = businessQueryManager.findClassificationSchemeByName(findQualifiers, "geography");

    // Create the classification passed as a parameter to findOrganization() method
    Classification us = businessLifeCycleManager.createClassification(geography, "United States", "5415");

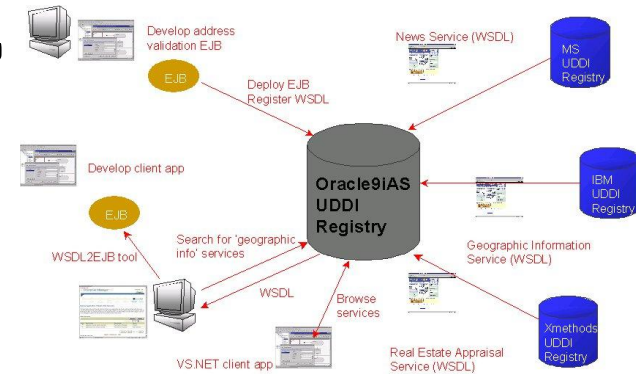
    // Add classifications to the classifications collection
    Collection classifications = new ArrayList();
    classifications.add(computerSystemsDesign);
    classifications.add(us);

    // Invoke the findOrganizations() method on BusinessQueryManager
    BulkResponse bulkResponse =
        businessQueryManager.findOrganizations(findQualifiers, classifications);

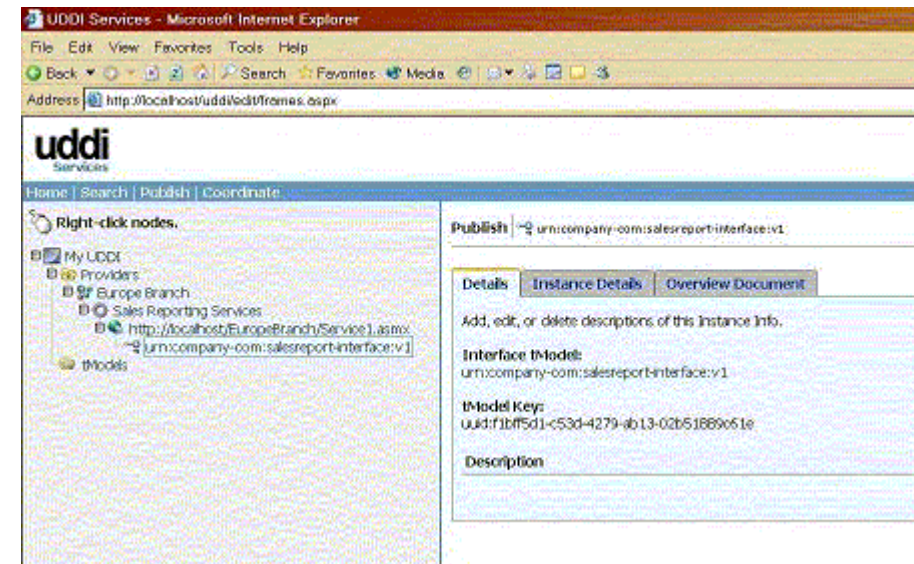
    if (bulkResponse.getStatus() == JAXRResponse.STATUS_SUCCESS) {
        System.out.println("Found Organization...");
    }
}
```



- Oracle 9iAS UDDI registry
 - <http://otn.oracle.com/tech/webservices/htdocs/uddi/>
- pUDDIng
 - Open source J2EE UDDI registry
 - <http://www.opensorcerer.org/>
- JUDDI
 - <http://www.juddi.org>
 - <http://sourceforge.net/projects/juddi>
 - An open source implementation of UDDI version 2
 - Written in Java
 - Can be deployed to any Servlet 2.3 container
- IBM's UDDI4J: "Matchmaking for Web services"



- Windows Server 2003
 - “Enterprise Universal Description, Discovery, and Integration (UDDI) Services”
 - Can be backed onto MS SQL Server
 - Integrates with Active Directory for authorisation and authentication
 - MS’s own UDDI registry is running under Server 2003



- June 2001
- Provides a way (*PublisherAssertions*) for multiple entities (multiple UDDI BusinessEntity objects) in a UDDI directory to link themselves in a hierarchy or in a horizontal, point-to-point chain
 - Especially important for large organizations with many divisions or subsidiaries that will register themselves in a UDDI directory
- Adds a mechanism for those querying a UDDI directory to verify that the statements an organization makes about itself are true
 - UDDI 2.0 directories pass information in checked taxonomies through a verification process (left unspecified by the standard) before allowing the entries to be registered
- Internationalisation
- Better searching
 - E.g.: “Find a business in a specific geographical area that supports this language and can interact using this security protocol.”
- Becoming more open
 - <http://soapuddi.sourceforge.net/>

- 19 July 2002
- Much augmented

- Security Services

- Digital signatures

- supports digital signing of any of five elements: businessEntity, businessService, bindingTemplate, tModel, and publisherAssertion

- Federation of registries

- Policy realms

- Define how registries are federated

- Changes to information model

- Better separation of data/metadata; multiple overview documents

- Changes to discovery model

- SQL-style wildcard searches; nested queries; paged resultsets

- Subscription services

- Lets a publisher know of changes

- Naming conventions

- Permits *entity promotion*, a device that lets a publisher propose a new key for an entity

"With a vast array of enhancements - including multi-registry topologies, increased security features, improved WSDL support, a new subscription API and core information model advances - the Version 3 specification offers clients and implementors a comprehensive and complete blueprint of a description and discovery foundation for a diverse set of Web services architectures." says Luc Clement, Microsoft UDDI Program Manager

- Why UDDI?
 - Recall: *“Who controls the registry...”*
- WS-inspection allows for the direct inspection of a site for available services
 - *“closely resembles business cards”*
 - *“While UDDI can be seen as a phone book, WSIL is more like a business card.”*
- Provides a completely distributed model for providing service-related information
 - Follows on from Microsoft DISO and IBM ADS

“Right...so, if you look at the core Web services specs, it's SOAP and it's WSDL...and I guess UDDI for basically publication and directory lookup and discovery...though in point of fact, personally, I don't think that's really that crucial; it almost doesn't matter how you do your discovery, but it's the SOAP and WSDL piece.”

—Jeff Mischinsky, Director of Web Services Standards for Oracle

- Example WSIL
 - Stock quote service description
 - Also links to other services
 - <http://msdn.microsoft.com/library/en-us/dnglobspec/html/ws-inspection.asp?frame=true>

```
<?xml version="1.0"?>
<inspection xmlns="http://schemas.xmlsoap.org/ws/2001/10/inspection/"
            xmlns:wsiluddi="http://schemas.xmlsoap.org/ws/2001/10/inspection/uddi/">
  <service>
    <abstract>A stock quote service with two descriptions</abstract>
    <description referencedNamespace="http://schemas.xmlsoap.org/wsdl/"
                  location="http://example.com/stockquote.wsdl"/>
    <description referencedNamespace="urn:uddi-org:api">
      <wsiluddi:serviceDescription location="http://www.example.com/uddi/inquiryapi">
        <wsiluddi:serviceKey>4FA28580-5C39-11D5-9FCF-BB3200333F79</wsiluddi:serviceKey>
      </wsiluddi:serviceDescription>
    </description>
  </service>
  <service>
    <description referencedNamespace="http://schemas.xmlsoap.org/wsdl/"
                  location="ftp://anotherexample.com/tools/calculator.wsdl"/>
  </service>
  <link referencedNamespace="http://schemas.xmlsoap.org/ws/2001/10/inspection/"
        location="http://example.com/moreservices.wsil"/>
</inspection>
```

- To “create a competitive edge”
 - I wonder...can we cope with [various] ‘extended’ registry services?...
 - Recall: “who controls the registry...”

"UDDI Registry Extensions extend two of the base UDDI 2 find APIs, find_business and find_service, thus allowing the formation of complex queries. That is, the find_business API will be extended with an embedded find_service API, and find_service with an embedded find_business API.

To make equivalent queries with the current UDDI search technology, the client search requester must perform two steps: 1) Issue two queries: a find_business query and a find_service query, and 2) Process the two sets of results returned by the queries and perform the appropriate intersection of the results, which is complex and error-prone.

Therefore, UDDI Registry Extensions create a competitive edge for IBM's UDDI Registry over those of the competitors in two ways: They reduce client programming complexities and make the IBM UDDI Registry easier to use. They reduce network bandwidth usage and improve performance"

- *“UDDI’s Problem: Technology Cannot Replace Relationships”*
 - *KEN VOLLMER, InternetWeek*
- *“What will restrict the success of a directory like UDDI is the same thing that handicapped marketplaces: the real needs of enterprises. It's more about working well with partners you know, rather than finding new ones.”*
- *“I can see real benefit to the SOAP Web services community of having an index to SOAP based web services that is independent from the main UDDI servers. There is an inevitable problem of course, which is that I can't think of a revenue model!”*

References

- Example
 - <http://staff.develop.com/bobb/WS-InspectionSamples.zip>
- Microsoft's UDDI site
 - <http://uddi.microsoft.com>
- Online 'Yellow Pages' goes live with a bang
 - <http://www.infoworld.com/articles/hn/xml/01/05/02/010502hnuddi.xml>
- UDDI Technical White Papers
 - uddi.org
- The True Nature of Web Services
 - <http://www.techmetrix.com/trendmarkers/tmk0501/tmk0501-2.php3>
- UDDI Seeks it's Spot
 - <http://www.infoworld.com/articles/se/xml/02/06/03/020603seuddi.xml>
- UDDI's Problem: Technology Cannot Replace Relationships
 - <http://www.internetweek.com/columns01/beat062001.htm>
- Why UDDI Seems Pointless
 - [http://weblogs.userland.com/eclectic/stories/storyReader\\$419](http://weblogs.userland.com/eclectic/stories/storyReader$419)
- UDDI 3.0 series
 - <http://www.winnetmag.com/Articles/Index.cfm?ArticleID=26234>
 - <http://www.winnetmag.com/Articles/Index.cfm?ArticleID=26427>
 - <http://www.winnetmag.com/Articles/Index.cfm?ArticleID=26610>
 - <http://www.winnetmag.com/Articles/Index.cfm?ArticleID=26790>
 - <http://www.winnetmag.com/Articles/Index.cfm?ArticleID=26947>
 - <http://www.winnetmag.com/Articles/Index.cfm?ArticleID=27035>