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Reinventing the Wheel?
CORBA Web Services

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Why Bother? (1)

- Real-life systems are complex
  - e.g. telecommunication (see previous slide),
  - E-commerce, banking and finance, healthcare, etc.
- Complex systems cannot be built as one single standalone application
- Complex systems require
  - Distributed applications
  - Interoperability
  - Location transparency
  - Ease of programming to avoid accidental complexities

Why Bother? (2)

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- CORBA, technology of choice for distributed applications
  - Numerous success stories
  - Well accepted and active standard
  - Used in most mission critical applications
- Web Services, a new emerging technology
  - Unprecedented hype
  - Support from the major players (IBM, Microsoft, SUN)
  - Leverage on the XML hype
  - An evolution of the "Web-way" of doing things
- Key issues
  - How do both technologies compare?
  - When to use which?
  - Convergence between both technologies

Roadmap of this talk

- CORBA in a nutshell
- WS in a nutshell
- Side by side comparison
- Applicability of CORBA and WS
- CORBA / WS interoperability
- Conclusion

CORBA in a nutshell

CORBA in a nutshell (1)

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- CORBA = Common Object Request Broker Architecture
  - 1.0: 1991; 2.0: 1996; 2.3: 1998; 3.0: 1999
- Open standard (Object Management Group)
- CORBA is an object bus
  - client can invoke methods on remote (server) objects
    - independently of the language the objects are written in
    - independently of the location of the objects
- Client-Server mediation via object request brokers (ORBs)
- Communication via IIOP
- Capabilities of objects defined by Interface Definition Language (IDL)
- CORBA services: naming, trading, security, persistence, events

CORBA in a nutshell (2)

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- Life-cycle of a CORBA application
  - Define the service as IDL interfaces
  - Compile the IDL to generate stub and server skeletons
  - Implement the service and associate it with the skeletons via the Portable Object Adapter
  - Publish the service with a Naming or Trading service
- Client processing
  - Contact Naming service to get appropriate object reference
  - Invoke operations (static or dynamic) on the object reference via stubs
  - Process incoming reply or exception

CORBA in a nutshell (3)

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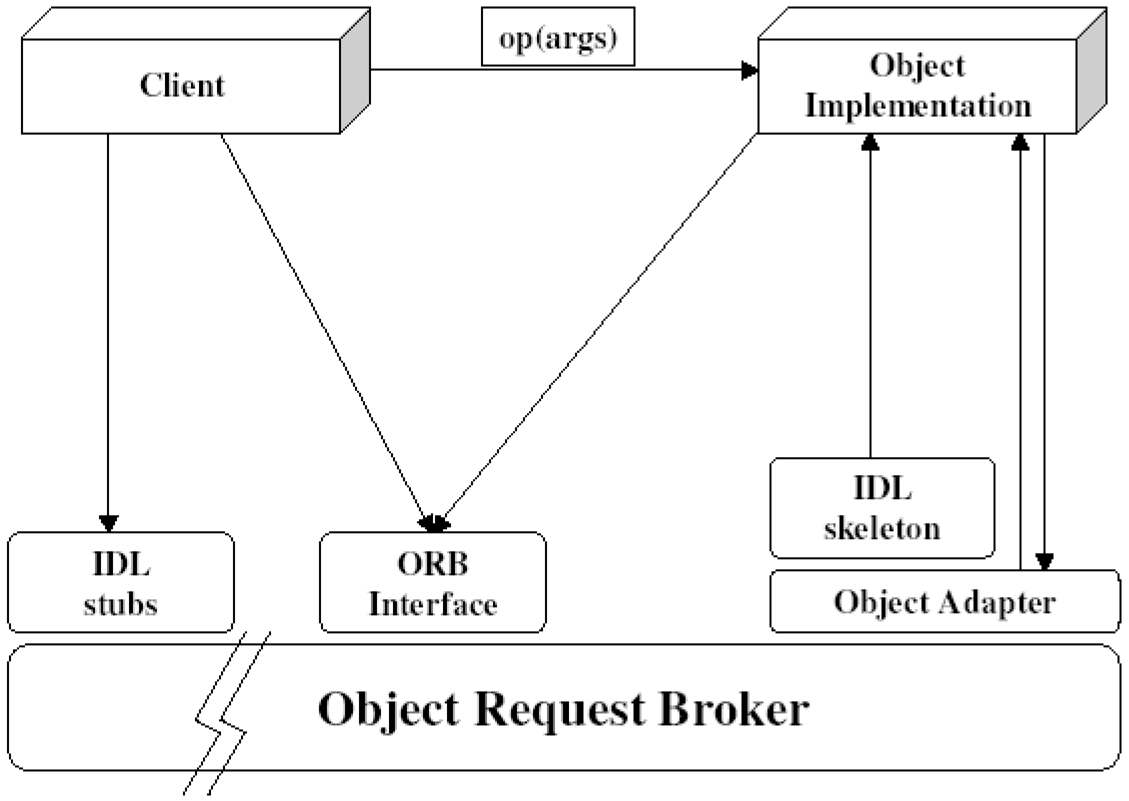
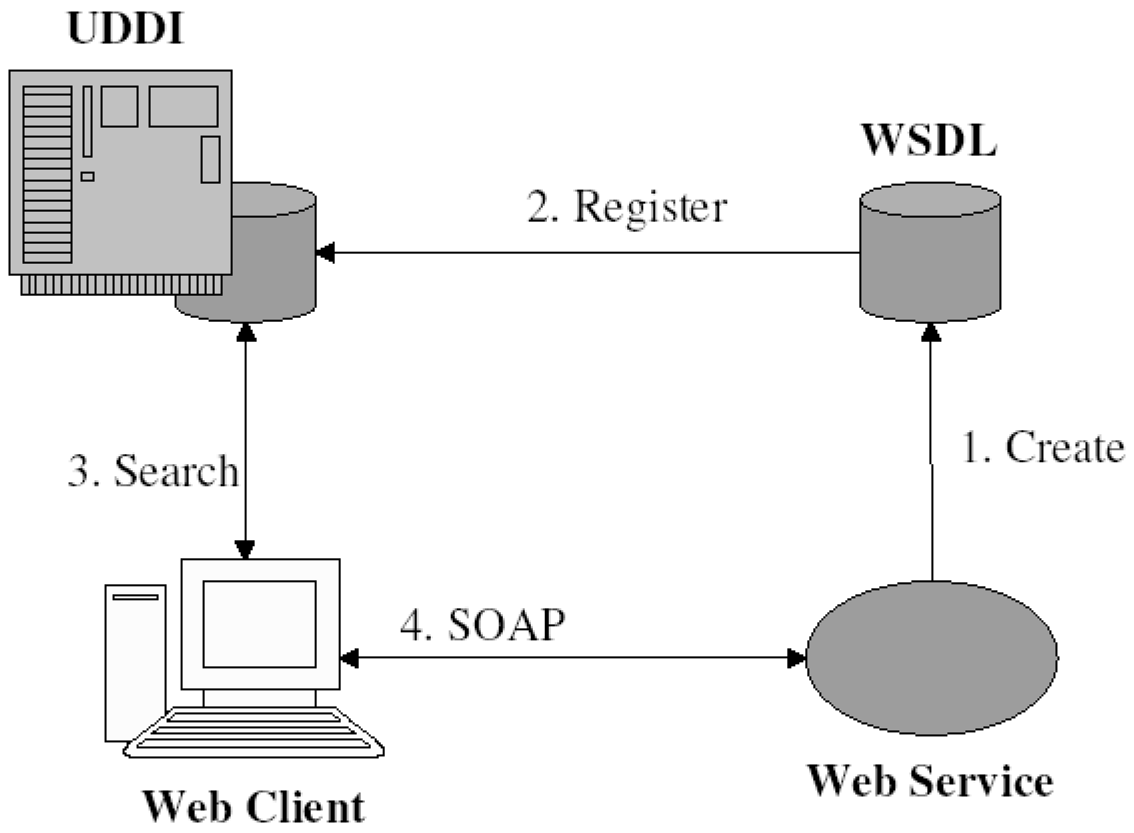


WS in a nutshell

WS in a nutshell (1)

- Web Services are an emerging middleware technology based on a simple XML-based protocol (SOAP)
  - XML-RPC: 1999; SOAP: 2000
- Web Services = suite of technologies WS-xx
- Web Services described in terms of messages accepted and generated using WS-Description Language (WSDL).
- WS focuses heavily on service discovery (UDDI).

WS in a nutshell (2)



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Side by Side Comparison

Keep in mind that one can implement
Web Services on top of CORBA
or CORBA on top of Web Services.

Side by Side Comparison (1)

	CORBA	Web Services
Type System	IDL (static + runtime checks)	XML Schemas (runtime checks only)
Transfer Syntax	CDR (binary)	XML (UTF)
State	Stateful	Stateless
Registry	Interface repository Implementation repository	UDDI/WSDL
Service Discovery	CORBA naming/trading service	UDDI
Security	CORBA security service	HTTPS, XML signature
Firewall Tunneling	Work in progress	Over HTTP

Side by Side Comparison (2)

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CORBA stack	Web Services stack
IDL	WSDL
CORBA Services	UDDI
CORBA stubs/skeletons	SOAP messages
CDR binary encoding	XML UTF encoding
GIOP/IIOP	HTTP
TCP/IP	TCP/IP

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Applicability of CORBA and WS

Which one to use, when?

Applicability based on

- Web interfaces
  - XML is the Web data model → WS
- Secure architecture with firewalls
  - HTTP is usually accepted by firewall → WS
  - But a lot of WS related traffic on port 80 will create problems
- Legacy components (e.g. other CORBA, EJBs, etc.)
  - CORBA component model superset of EJB → CORBA
- State
  - State captured by object instances → CORBA
  - + CORBA persistence and transaction services

Applicability based on

- Mobile environment
  - Disconnected environments favor stateless protocols
  - SOAP has a notion of message routing → WS
- Thin clients
  - CORBA requires ORB libraries (all or nothing)
  - WS only require to send/receive messages → WS
- Proxies
  - Changes in routing of method calls requires ORB changes
  - SOAP is proxy friendly (message rewriting) → WS
- Performance
  - CORBA more mature + binary encoding → CORBA
  - WS are more at the level of prototypes and betas

Applicability based on

- Human factor
  - Learning curve ??
  - Past experience ??
  - Future will tell.
- Maturity
  - CORBA: > 10 years
  - WS: < 2 years

CORBA / WS Interoperability

Why is it important

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- Revenue Growth
  - Cost of phone calls is dropping
  - Carriers are looking for new revenue creating services
  - Convergence of traditional telephony services and web services is the future
- Motivating example
  - Mobile Restaurant Locator service
  - Location info from wireless service provider (CORBA interface)
  - Restaurant info from Web site (e.g. Zagat)
- Issues
  - Protocol translation
  - Mapping between CORBA and WS data models

Possible scenario

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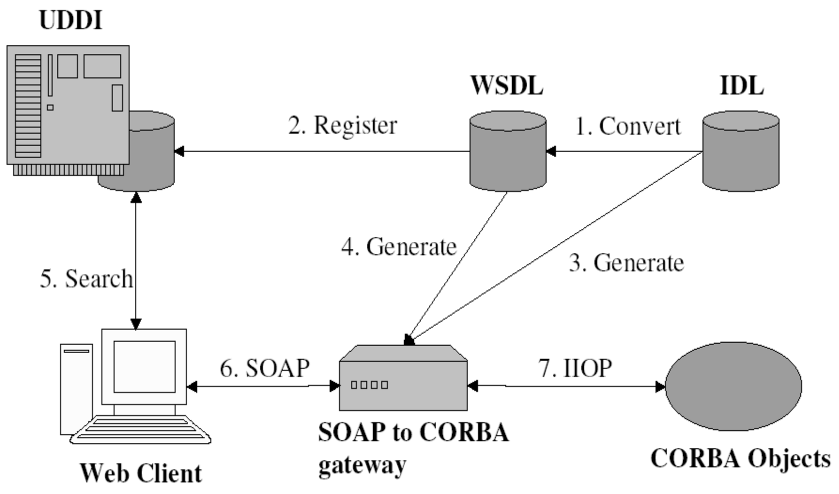
- SOAP request parsed
- Gateway looks up IDL description
- Gateway looks up WSDL description of the SOAP request
- A dynamic CORBA request is built and sent to the server using DII
- SOAP response is built out of the CORBA response



Conclusion

Conclusions (1)

- Distributed systems inherently complex
  - No one-size-fits all solution
  - No silver bullet, despite all the hype around WS
- CORBA = mature technology (around for 10 years)
  - CORBA value lies in CORBA services, platform and language independence, interoperability
- WS = emerging technology (invented < 2 years ago)
  - The only service offered by WS is UDDI
- WS wants to replace CORBA but represents a limited subset of what CORBA already offers today:
  - Discovery (UDDI)
  - No support for transaction, persistence, security, load-balancing, etc.

Conclusions (2)

- Danger of over simplification
  - WS as middleware layer on top of CORBA
  - There are examples where CORBA is middleware on top of WS-like layer (e.g. SIP protocol)
- XML does not mean WS
  - XML can be used with CORBA
- CORBA & WS not mutually exclusive but complementary
  - CORBA-SOAP and SOAP-CORBA gateways
  - Automatic mapping between IDL and WSDL