An introduction to SOA and the HP NonStop server environment

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Introduction

SOA is everywhere

• Vendors talk of SOA and IT nirvana
• Conferences, journals, and books are devoted to the subject
• Consultants espouse the benefits of SOA

So,

• What exactly is SOA?
• And why should you care about it?

We will help to answer these questions.
Topics

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Pressures on business...

Continuous business transformation

New demands

Supplier     Customer     Partner

Evolving business objectives

Growth, profit, and value
Leadership
Customer satisfaction
Innovation

Changing markets

Technology
Regulation/deregulation
Mergers and acquisitions
Economy
Competition
... require businesses to be agile
Achieving business agility requires new thinking

- Business agility means synchronizing business and IT to capitalize on change
- Synchronization means
  - Goals and actions of business and IT are in constant alignment
  - Changes can be made when the business requires
- But to make synchronization happen, you need changes in people and processes—not just technology

Business benefits: simplicity, agility, and value
The new thinking is service orientation

Service-oriented architecture (SOA) is the next important paradigm in IT evolution

- The core business motivation is business flexibility
- This must be achieved by enabling legacy systems to work together better and preserve the investment—exposing business assets without replacement
- As fundamental a change in IT architecture as client/server was to the mainframe or the Internet was to client/server

“It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change.”

Charles Darwin in The Origin of Species
Why you should care about SOA—summary

• SOA enables business agility
  – Flexibility and adaptability to changing business needs
  – SOA techniques mean more business processes are deployed more quickly and at reduced cost

• SOA reduces cost by preserving and leveraging investment in existing applications by enabling them to be used easily in new ways to support new business processes

• SOA helps eliminate information silos
  – Use of standard access methods promotes interoperability and facilitates integration
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What is SOA?

• SOA is not a product; you cannot just download it
• SOA is a new approach—a paradigm—to building IT systems using services
• Services are business processes that are available on a network, and they can be accessed easily in a standardized fashion
  – Without knowledge of the underlying implementation
• SOA encourages service reuse that enables existing services to be applied easily to new business processes
  – Reduces the time to implement a new business process leading to business agility
  – Software reuse is not a new concept, but unlike previous models, SOA provides a comprehensive foundation to deliver on the promise
What is a service?

- An SOA service is a unit of business automation logic and is defined by a standard service description.

- The service description is expressed using the Web Services Description Language (WSDL):
  - Expresses an unambiguous contract between the service provider and the service consumer.
  - Describes the operations offered by the service, how and where to access the service, input/output message formats, etc.

- Business processes are automated by implementing a set of SOA services that interact with each other to perform the task.
  - "Atomic" services are combined easily to create new business processes.
  - Example: an application that supports the business process "Manage Order" can be created by combining services such as:
What is a service? (continued)

• The service definition encapsulates the service implementation
  – The service consumer does not know nor care how the service is implemented

• This has two key benefits:
  – The service consumer has a standard way to access any service
    • Does not need to understand service-specific communication protocols and message formats (such as IIOP or RMI, etc.)
  – The service provider is free to implement the service using whatever technology is best suited for that service

• These characteristics facilitate the SOA goal of increased business agility by enabling:
  – Ubiquitous application interoperability
    • Any service can access any other service easily
  – Reuse of existing software assets
    • Can be “hidden” behind a standard service definition
Summary—how SOA enables business agility

• The basic SOA principles described enable:
  – Service reuse
  – Leverage of existing IT assets
  – Freedom of choice of implementation
  – Ease of change
  – Service scalability

• When IT systems are implemented to these principles, new business processes can be delivered more quickly, less expensively, and with consistent and predictable service and performance levels
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Basic SOA building blocks

- An SOA service can be a new or existing software component
- It can be a COBOL Pathway server, a C NonStop Tuxedo service, a C++ NonStop CORBA object, a Java™ application (POJO, Servlet, JSP, or EJB), or ...
- To make it an SOA service, the application must be presented in a standard way
- To do this, industry-standard technologies have evolved that address the basic needs:
  - Description: how SOA service interfaces are described
  - Messaging: how SOA services are invoked
  - Discovery: how SOA services are found
Description: how SOA service interfaces are described

• No matter how it is implemented, the service is described using the **Web Services Description Language (WSDL)**
• WSDL is a W3C industry standard
• Defines the public interface to the service (the service contract)
  – Methods provided by the service
  – Protocol to access the service
  – Request and response message formats
  – Expressed using XML
• Used by service consumers to construct messages to access the service
Messaging: how SOA services are invoked

• For ubiquitous interoperability and maximized service reuse, the service access protocol should be a widely adopted standard

• For SOA, generally this is SOAP messages carried over HTTP transport
  – SOAP and HTTP are also W3C standards

• Other transports can be used in special cases
  – For example, a reliable messaging protocol such as IBM WebSphere MQ

• The protocol that will be used to access the service is specified by the WSDL
Discovery: how SOA services are found

• To be of any use, service providers and how they can be accessed must be known to service consumers
  - The WSDL service definition needs to be “published”

• Well-known Public Registry (e.g., a UDDI directory)
  - Can be queried by service consumers
  - Enables runtime dynamic service discovery and invocation

• Other means
  - The WSDL definition is made available by some private mechanism to the service consumer at development time
  - For example, the service provider developer provides the WSDL to the service consumer developer directly

In most initial implementation stages, a public registry is not used. You *know* where the service is.
Designer: At the bottom, "know " is bolded for emphasis. Is this allowed according to the branding guidelines?
Basic SOA building blocks

SOA service consumer (Accesses)

SOAP/HTTP

SOA service provider (Describes)

WSDL (Publishes)

Consumer application accesses SOA service based on description in WSDL

WSDL describes the SOAP header that will be used to invoke the SOA service

SOA service provider makes WSDL available to consumer (via UDDI, e-mail, URL, etc.)
# Topics

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SOA and the HP NonStop server—overview

- In an agile enterprise, services must be available, scalable, performant, and manageable
  - Requirements tailor-made for the HP NonStop server platform
- Most NonStop applications are already 90% SOA enabled because the service model is the **natural** way to create applications on NonStop servers
  - Think of “Create Order” or “Fulfill Order” SOA services as Pathway serverclasses, NonStop Tuxedo services, NonStop Servlets for JSP, or NonStop CORBA objects
- The NonStop server supports the necessary tools and infrastructure to support the WS-I Basic Profile
  - SOA services deployed on NonStop servers are fully standards compliant and may interoperate with SOA services on other compliant platforms
- The NonStop server is an excellent platform for providing SOA services
  - Preserves customer investment in existing applications by enabling them to be leveraged and composed as part of a heterogeneous SOA application
    - *You have data others would love to get to*
  - Enables new applications to be developed for the NonStop server that conform to the SOA standard model
The NonStop server supports the WS-I Basic Profile through a set of products that address the following three requirements:

- **Service access**—how remote SOA service consumers can access SOA providers on the NonStop server using SOAP and HTTP
- **Service invocation**—how the target service business process is invoked from a service adapter
  - A service adapter is a proxy service running on the NonStop server, which provides the necessary protocol and data translation between the invocation request (SOAP over HTTP) and the native protocol of the actual service (e.g., a Pathway server)
- **Service implementation**—the actual service business logic

SOA and the HP NonStop server—product technologies
SOA and the HP NonStop server—technologies for service access

• HP iTP WebServer software
  - Provides the basic HTTP protocol service and acts as a scalable and available container for other components (using NonStop TS/MP internally)

• HP NonStop SOAP software
  - NonStop SOAP (plus iTP WebServer) supports the standard runtime SOAP over HTTP SOA service access protocol
  - Runs as scalable serverclasses under iTP WebServer
  - GUI wizard to easily expose Pathway servers as SOA services
    - Contains a built-in service adapter for Pathway servers
  - Customizable user exits to enable use with SOA services implemented in other application environments
    - Create your own service adapter
  - Includes an XML document parser and the open-source gSOAP toolkit for access to remote SOA services using SOAP (i.e., NonStop can be the client)
NonStop SOAP

Design time

- SOAP Admin
- WSDL
- SDR
- SDL
- DDL dictionary

Runtime

- Internet
- TP WebServer (HTTPd)
- SOAP server
- NonStop TS/MP serverclass or process

NonStop TS/MP serverclasses
SOA and the HP NonStop server—technologies for service access in Java

• HP NonStop Servlets for JavaServer Pages (NSJSP) software
  – Container for hosting SOA services written in Java
  – Fortified version of the Apache Tomcat Servlet and JSP container
  – Runs as scalable serverclasses under iTP WebServer

• Apache Axis2 software
  – Open-source product
  – Runs under NonStop Servlets for JSP container (inherits scalability, etc.)
  – Includes a SOAP protocol engine and tools for WSDL generation
  – Alternative to NonStop SOAP if you want to use Java SOA services

• BEA WebLogic Server software
  – Complete J2EE and SOA application server infrastructure
    • HTTP and SOAP server for service access
    • Servlet/JSP/EJB container for service adapters and business logic
    • Supports additional WS-* SOA standard services
SOA and the HP NonStop server—
technologies for **service invocation**

- Use the native interface as appropriate between the service adapter and the service implementation
  - Pathway => Pathsend
    - If the service adapter is written in Java, use the JToolkit **JPathsend** Java interface
  - NonStop CORBA => IIOP
  - NonStop Tuxedo => ATMI
SOA and the HP NonStop server—technologies for service implementation

• Remember that the approach to implementing business logic does not change when using SOA
  – Mission-critical requirements for application scalability and availability still apply

• Choose the most appropriate programming environment to implement the service business logic
  – Depends on existing applications, company middleware technology standards, and specific service requirements

• Any of the NonStop server application middleware environments can be used to implement SOA services
  – Pathway, NonStop Tuxedo, NonStop CORBA, Java (NonStop Servlets for JSP, BEA WebLogic Server)
SOA and the NonStop server—product technologies summary

NonStop server

NonStop TS/MP
Scalable and available execution container

HP iTP WebServer
NonStop SOAP
Service adapters

Pathway
NonStop CORBA
NonStop Tuxedo
Java

Pathsend JToolkit
IIOP
ATMI

Service implementation

Service invocation

HP NonStop Servlets for JSP
Apache Axis2
Service adapters

Service access

BEA WebLogic Server

SOAP HTTP
Planned NonStop SOA technology enhancements

• NonStop SOAP
  – More complete W3C SOAP 1.2 and WSDL 1.1 standards compliance
  – Target: CY 2H 2007

• SOAP Client
  – Bring to open source gSOAP current level (version 2.7.9)
  – FCS: March 2007

• iTP WebServer
  – Add support for Transport Layer Security (TLS)
  – FCS: CY 2H 2007
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Major hardware retailer

1000s of cash registers in stores
1.5 billion customer transactions per year

XML data
Sales information

Internet

NonStop system

Pathway apps.
NonStop SOAP
iTP WebServer

IBM

Detailed info of every sale: items, price, date, credit, etc.
No-receipt refunds: hassle-free and fraud-free
Results

- Five major POS releases in 18 months
  - They used to do one a year
- New GUI for all associates
  - No more green screens
  - Training is no longer needed, a huge cost savings
- The NonStop system is now the payment hub for the enterprise
- They have earned the respect of the entire organization

- They can rapidly react to a changing marketplace
- Hiring and training is cheaper and easier
- The team now has Web designers and developers of UNIX-like programs
- Junior programmers can knock out fully tested database servers in a few days
Major telco (1) before

Central office billing

Tuxedo clients

Appl. servers

Middleware

Back end

NonStop system

Pathway apps.

Replicator

Hub client

Tuxedo 8.5

Tuxedo 6.5

Tuxedo 6.5

NCR

RSC

RSC

NCR

HP-UX

Oracle 8i

HP-UX

SQL Net
Major telco (2) after simple deployment of SOAP
North America electronics company order processing application

1. SOAP server creates WSDL from DDL for Pathway serverclass handling order processing.

2. webMethods uses WDSL to access order processing on the NonStop server via standard Web services.

3. Web customers submit orders. From the Web server, the orders are sent to the webMethods Server. Part of its processing is to send the order to the Web service on the NonStop server and receive a confirmation.
Insurance drug claims are sent to the SQL database to which queries can be made.
European finance corporation

- Internet
- Intranet/extranet
- Firewall
- IIS
- Security
- Web service wrapper
- NonStop SOAP
- Web services
- SQL
- ATM log file
- POS log file

- VPNs
- BASE24 appl.
- Two Itanium® based 4-processor systems

- Customers
- Help desk
- Banks
- POS
- ATMs
- MC
- Visa
- POS
- Visa
- MC
- ATMs
- Banks
- Help desk
- Customers

Windows® 2003 server

5 April 2007
Summary

- SOA is an important new methodology for deploying IT business processes
- SOA helps to enable business agility
  - More quickly, less expensively
- The NonStop server can play a key role in the provision of highly available, scalable SOA services
- The NonStop server supports the necessary toolset to implement standard SOA services
  - Existing NonStop server applications can be exposed easily as SOA services, preserving investments
  - New SOA services can be developed easily for the NonStop server
- SOA services deployed on the NonStop server can interoperate with services on other platforms in a standard manner
  - You can break NonStop out of its “corner”

SOA and the NonStop server—made for each other
For more information:
Presentations, white papers, customer stories

http://h20223.www2.hp.com/NonStopComputing/cache/455562-0-0-0-121.html