



NonStop Java & Middleware Update

5th December 2013

HP NonStop Product Management

Forward-looking statements

This is a rolling (up to three year) Roadmap and is subject to change without notice.

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Agenda

Why Middleware and What should it offer?

Modern NonStop Software stack

Middleware product updates (product overview, new features, ordering information, future plans)

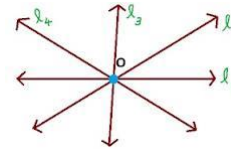
- NonStop server for Java (NSJ)
- NonStop Application Server for Java (NSASJ)
- NonStop Message Queue (NSMQ)
- Open Source Java Frameworks (SASH)
- NonStop Servlets for JavaServer Pages (NSJSP)
- iTP Secure Web Server
- New XML Parser
- NonStop SOAP

Summary



Why Middleware and What should it offer?

- Simplified programming – Common services via high-level APIs
- Workload management (scalability, performance)
- Continuous availability – Automatic failure detection and recovery
- Concurrency control and transaction data integrity
- Interoperability – Support standard communication paradigms with simple APIs
- Manageability – Make it easy to operate large pools of application resources, provide security controls, status and error reporting



Modern NonStop middleware stack



All Standard



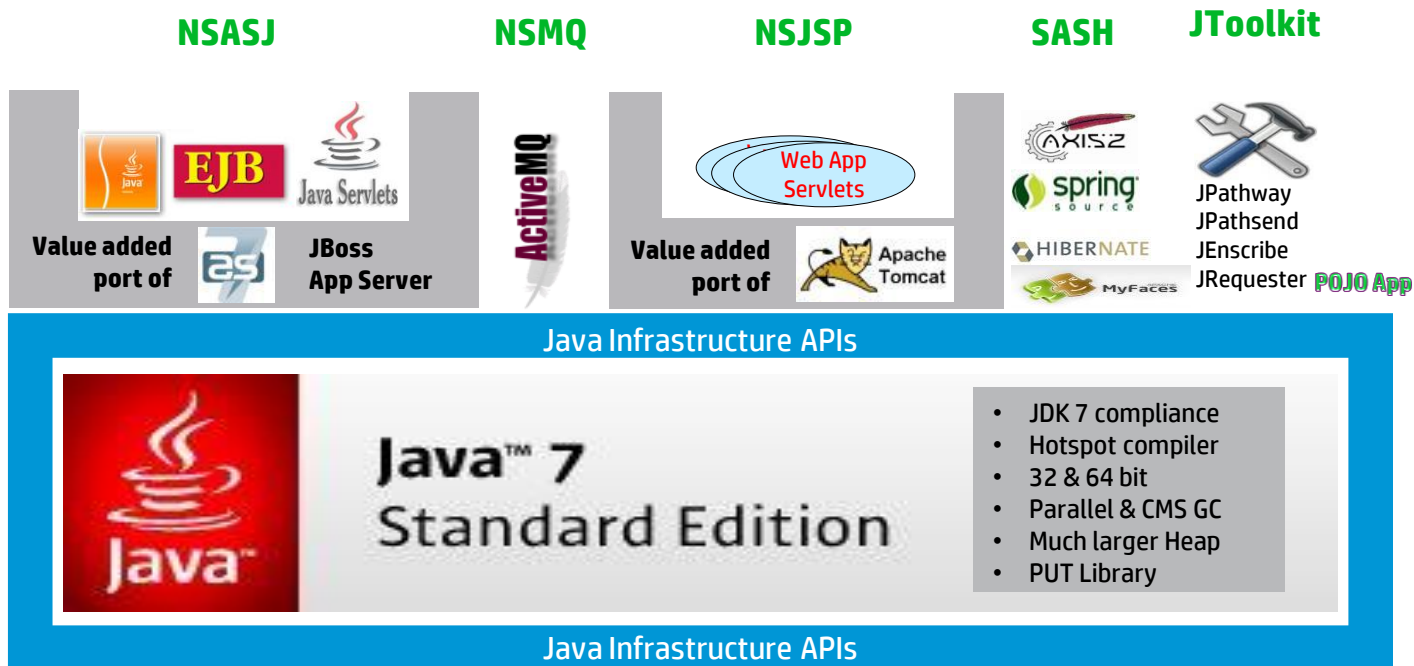
All NonStop



The NonStop Fundamentals



NonStop Basket for Java



NonStop Server for Java (NSJ)



NonStop Server for Java 7 features (1...)

NSJ 7 features

Based on Oracle JDK 1.7.0_01 version

- Certified Java implementation
 - Optimized for Intel Itanium

First 64-bit NSJ release

- Supports both 32 and 64 bit installations

Improved garbage collection

- Parallel and Concurrent Mark Sweep GC
- Reduces application pause time
- Main app & the GC processes run on different cores of the CPU
- Enabled only in J-series systems

NSJ 7 features

Supports a very large Java heap

- Size is only limited by the physical memory of the system
- Typically a few hundreds of Giga Bytes

PUT Library

- ZPUTDLL (32-bit) and YPUTDLL (64-bit)
- More compliance to POSIX standards
- All I/Os are non-blocking
- SPT library is no longer part of NSJ

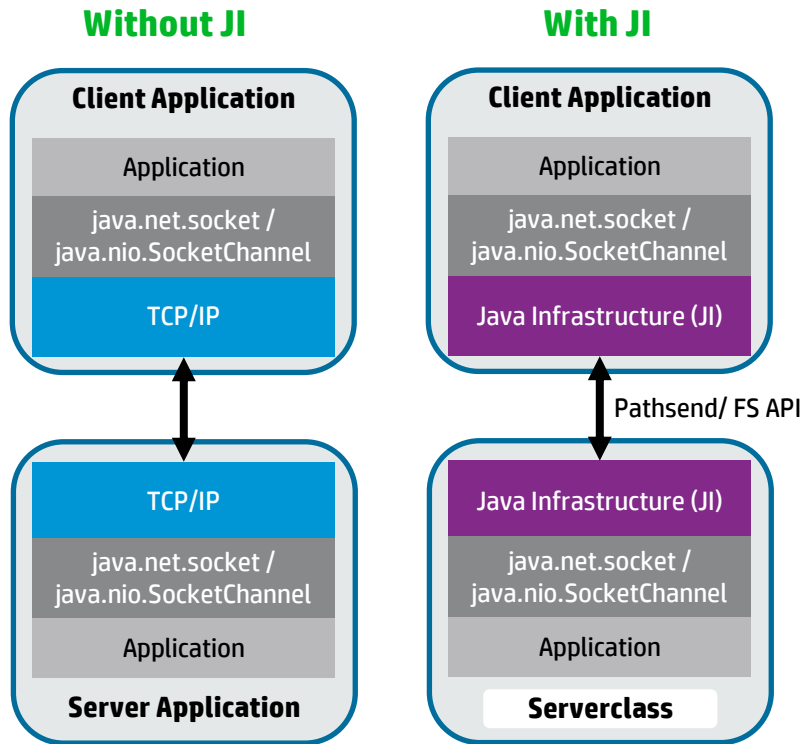


NonStop Server for Java 7 features (2)

NSJ 7 features

Java Infrastructure Library (JI Library)

- Plain Java socket interface
- Readily deploy Java Apps as TS/MP Serverclasses
 - With no/minimal NonStop specific modifications
 - Abstraction of TS/MP & FS specific NonStop APIs
- App developer need not know NonStop specifics to leverage *NonStop Fundamentals*
- Bidirectional operation
- App can be a Server or a Client



Future enhancements

Maintain concurrency with industry standard JVM releases

Continuing performance improvements

New Garbage Collection Algorithms



NSJ 7 Ordering information

- No need to order!!!
- H-series and J-series
 - NSJ 7 is available by default on the HSN01 and QSN01 SUT
 - From H06.26/J06.15 (Feb 2013 RVU)



NonStop Application Server for Java (NSASJ)

(Pronounced “En-Sas-Jay”)



NonStop Application Server for Java (NSASJ) 1.1



JBoss EJB & WEB Containers are...

Part of JBoss Application Server

- Open Source
- One of the widely used Java App Servers
- Full compliance to JEE 6 specifications

JBoss is Mature

- Top level project
- Developed & tested for 10+ years
- Extremely active development community
- Releases with new features + bug fixes occurring regularly

JBoss is a flourishing ecosystem

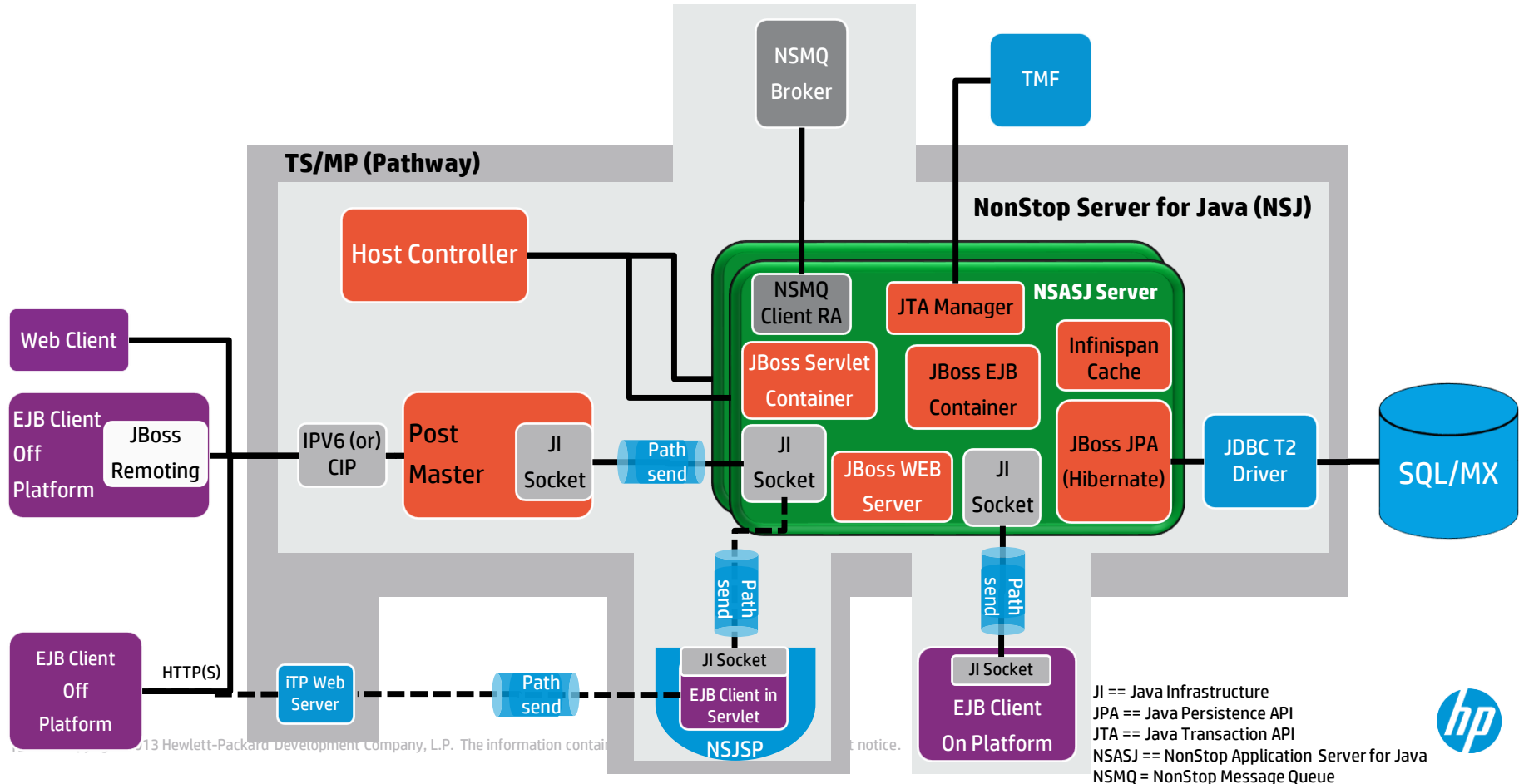
- Of developers, vendors, resellers, enterprise users
- Not just an implementation of JEE specifications

Strong support from Red Hat

Note:- “JBoss AS” community project has been renamed as “Wildfly” by Red Hat in May 2013. Release 8 will call “Wildfly 8”.



NSASJ 1.1 architecture



NSASJ 1.1 features (1...)

NSASJ enhances the enterprise capabilities of NonStop

EJB 3.0/3.1 Specifications

- Stateless , Stateful and Message Driven Beans

Servlet 3.0, JSP 2.2 Specifications

- Asynchronous request processing
- Web Fragments
- Annotations

On and Off Platform Clients

- Clients on the same NonStop system, a different NonStop system or an altogether different platform
- NSASJ supports JBoss Remoting 3 interface for off platform client access to EJB container
- Clients can also use HTTP(S) protocol to access the EJB container via the NSASJ Web Container

Continuous availability and near linear scalability

- NSASJ is a TS/MP Serverclass



NSASJ 1.1 features (2...)

NSASJ enhances the enterprise capabilities of NonStop

Transactions and Data Integrity

- The JTA implementation of JBoss (formerly Arjuna TS) is integrated with NonStop TMF
- Enables NonStop TMF controlled non-XA resources such as SQL/MX and Enscribe to participate in an XA transaction

Java Persistence API (JPA)

- Standard JPA APIs for sessions persistence (using Hibernate Entity manager)
- No need to know the specifics of NonStop T2 & T4 connectors

Security

- Off platform Remoting EJB clients' interactions are protected by Secure Socket Layer 3.0 (SSL 3.0)
- HTTP access to NSASJ 1.1 is protected by TLS 1.0/1.1/1.2 protocol
- Authentication & authorisation subsystem of JBoss AS is available as-is in NSASJ 1.1 for client verification and for validating the administrators/managers



NSASJ 1.1 features (3)

NSASJ enhances the enterprise capabilities of NonStop

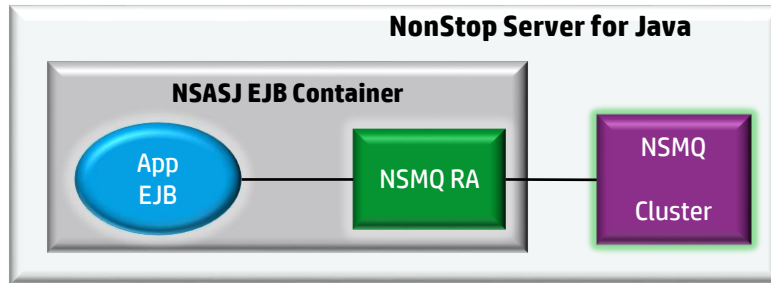
Temporary State Information Storage

- NSASJ uses Infinispan cache cluster that is part of the JBoss AS to store temporary state information of client sessions



Integration with NSMQ

- NSASJ has been integration tested with NSMQ using the JCA compliant Resource Adaptor provided by NSMQ
 - SLSB & SFSB are message producers; MDB is the message consumer



Application Deployment

- NSASJ CLI can be used to Deploy, un-deploy, redeploy, enable, disable and remove applications.
- Application development environments using Maven can be integrated with NSASJ similar to how it is done with JBoss AS

Future enhancements

Web GUI based management

Enhancements to JTA & NonStop transactions integration

JAX WebServices & REST services

JBoss AS version refresh



NSASJ 1.1 Ordering information

- H & J-series
 - NonStop Application Server for Java 1.0 Update 1 is the current software version
 - RVU H06.26/J06.15 Onwards

Product ID

HSJ87V1 - HP NonStop Application Server for Java 1.0 Update 1

QSJ87V1 - HP NonStop Application Server for Java 1.0 Update 1



Ordering Example

- HP NonStop Application Server for Java 1.0 Update 1 – QSJ87V1, * 2–16 processors
 - Ordering example: for a 2-processor system, order two of H/QSJ87V1

NonStop Messaging Queue (NSMQ)



NonStop Message Queue (NSMQ) 1.0

NSMQ

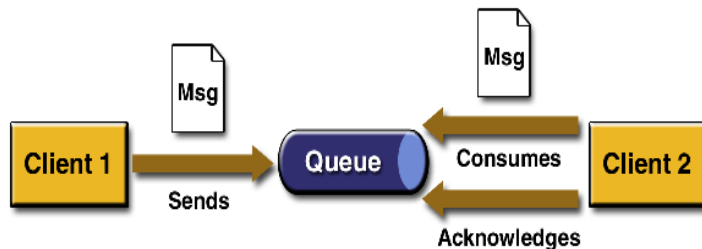


The Java Messaging Service provider on NonStop

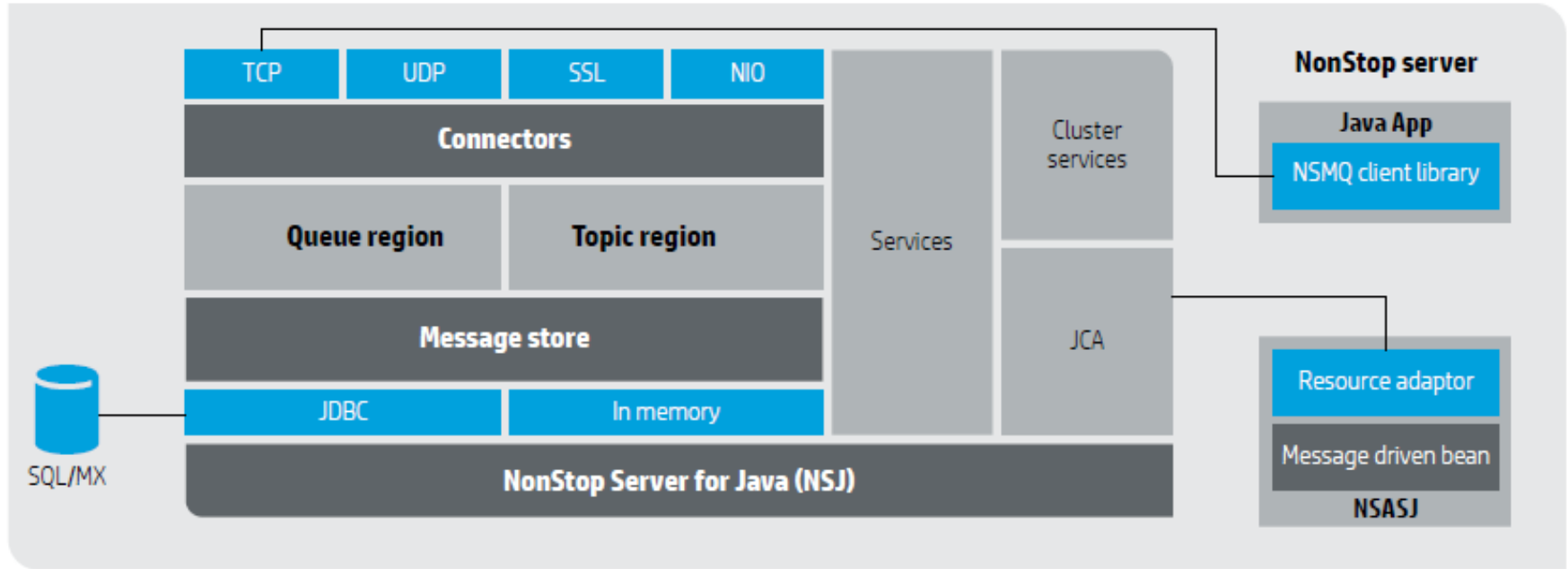
- A port of Apache ActiveMQ

Active MQ...

- Is one of the popular JMS implementations
- Complies with JMS 1.1 Specifications
- Provides Enterprise Features
 - Clustering for scalability and continuous availability
 - Can be accessed across platforms (Java, .NET, C/C++...)
 - However NSMQ 1.0 provides only Java APIs
 - Provides for persistence of messages via SQL/MX
- Supports asynchronous messaging, loose coupling between applications



NonStop Message Queue (NSMQ) 1.0



NSMQ 1.0 features (1...)

Standards based Interconnectivity with loose coupling

JMS 1.1# compliance

- As implemented by ActiveMQ 5.6.0

Java APIs to clients for sending, receiving, publishing and subscribing to messages

JCA compliant Resource Adaptor (RA) for Java Applications Servers such as NSASJ to connect to queues and topics

- NSASJ has been integration tested with NSMQ

Supports both Point-to-point and publish-subscribe# message exchanges

- Via Queues and Topics

Optionally persist messages in SQL/MX

- Mission critical applications will not lose messages in transit from sender/publisher to receiver/subscriber

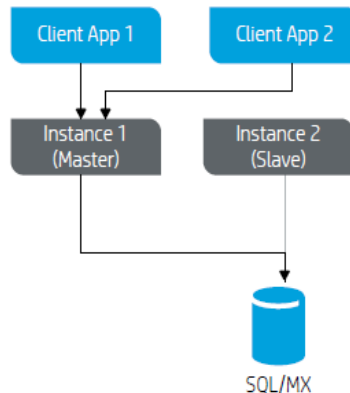


NSMQ 1.0 features (2...)

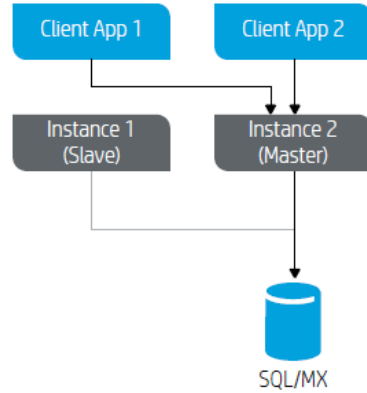
Standards based Interconnectivity with loose coupling

Continuous availability using Master-Slave Broker instances

- The slave takes over in the event of a master failure
- Slave recovers the messages persisted in SQL/MX to continue the operations



Before master fails



After master has failed and recovered

Scale by clusters of brokers

- More clusters of 2 brokers each can be added to enhance message processing capacity

TCP, UDP and Java NIO protocols are supported for clients

- Secure transfer of message is achieved through SSL 3.0

NSMQ 1.0 features (3)

Standards based Interconnectivity with loose coupling

JMS and Transactions

- JMS transactions (commit and rollback) are supported in both sending and receiving directions
- NSMQ clients can use the JTA compliant library to become part of NonStop TMF transactions

Supports Java Authentication and Authorization Services (JAAS)

- Clients are authenticated using username and password combination before allowing to operate
- Authorisation to READ, WRITE and to do ADMIN operations can be configured for each client
- Plug-ins can be used to extend JAAS



Future enhancements

Web GUI for management

Integration of C/C++ Applications

RESTful interface

Dynamic clustering

STOMP protocol support for clients

ActiveMQ version refresh



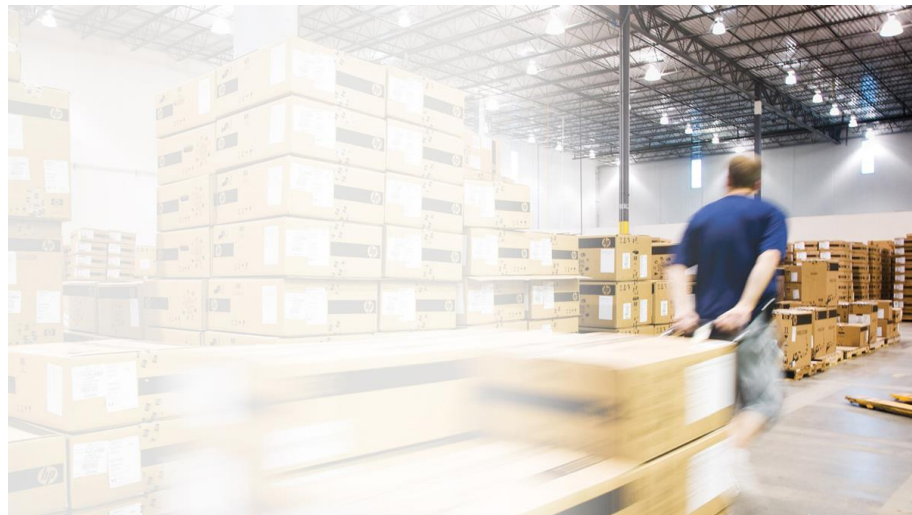
NSMQ 1.0 Ordering information

- H & J-series
 - NonStop Message Queue 1.0 is the current software version
 - Supported on RVU versions H06.25/J06.14 Onwards

Product ID

HNSMQ01V1 - HP NonStop Message Queue 1.0

QNSMQ01V1 - HP NonStop Message Queue 1.0



Ordering Example

- HP NonStop Message Queue 1.0 – QNSMQ01V1, * 2–16 processors
 - Ordering example: for a 2-processor system, order two of QNSMQ01V1

Open Source Java Frameworks on NonStop (SASH)



Open Source Java Frameworks on NonStop



Apache MyFace**S**

Component based web UI framework (JSF)



Apache **A**xis2

Web services framework (for SOA)



Spring

Framework to develop Apps using POJO components



Hibernate

Object Relational Mapping (ORM) framework (JPA)

SASH: MyFace**S**, **A**xis2, **S**pring, **H**ibernate

SASH 1.2 features

Spring (3.1.0)

- Integration of Spring Platform Transaction Manager with NonStop TMF
- Spring transactions can readily become part of TMF transactions
 - Spring application developers need not know NonStop TMF specifics

Hibernate and its Dialect (4.1.1, 3.6.8, 3.5.1)

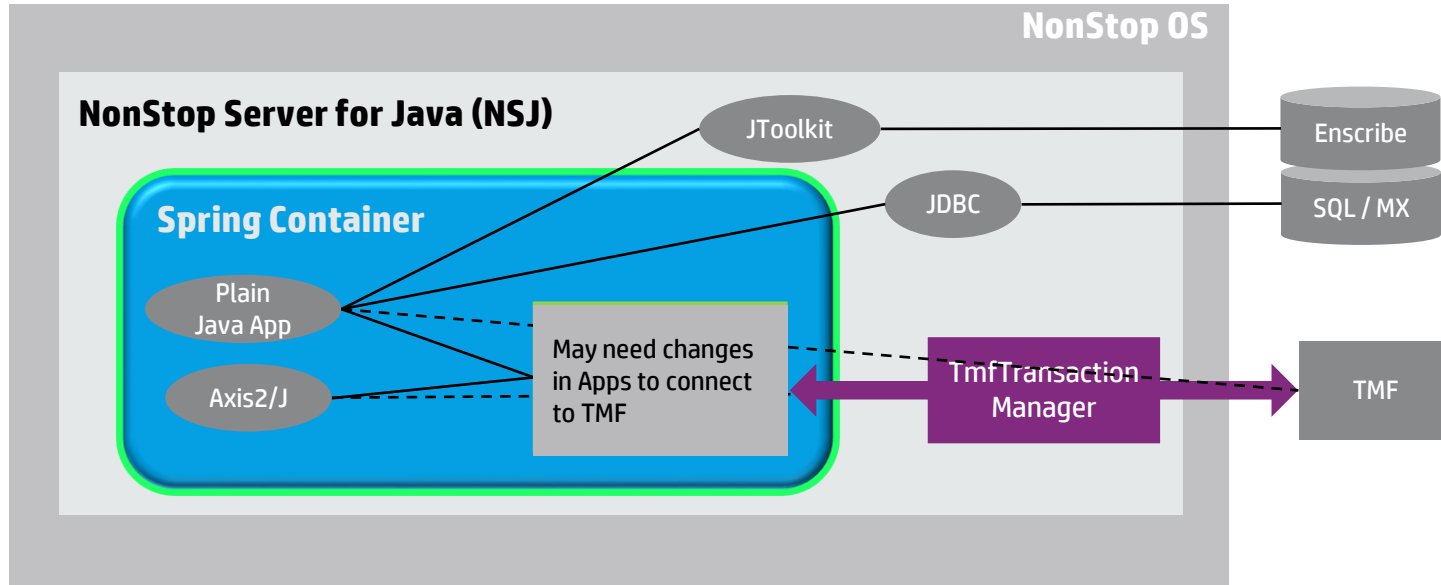
- Mapping Hibernate's JDBCExceptions to sub-exceptions
 - Saves writing SQL/MX specific code by Application developers to extract error subgroups
- Mapping between Java Objects' "id" parameter to "Identity Column" of NonStop SQL/MX database
- Various caching mechanisms and connection pooling configurations are studied and recommendations provided
- Leveraging Module File Caching (MFC) feature of SQL/MX in Hibernate queries

Artifacts from HP

- T0874 – This package contains sample apps
- T0873 – This contains the Hibernate Dialect file for SQL/MX
- T0937 – TMF Wrapper jar file
- T0873, T0874 & T0937 can be downloaded from Scout
- Integrated and tested by NED
- Open Source Java Frameworks on NonStop User's Guide



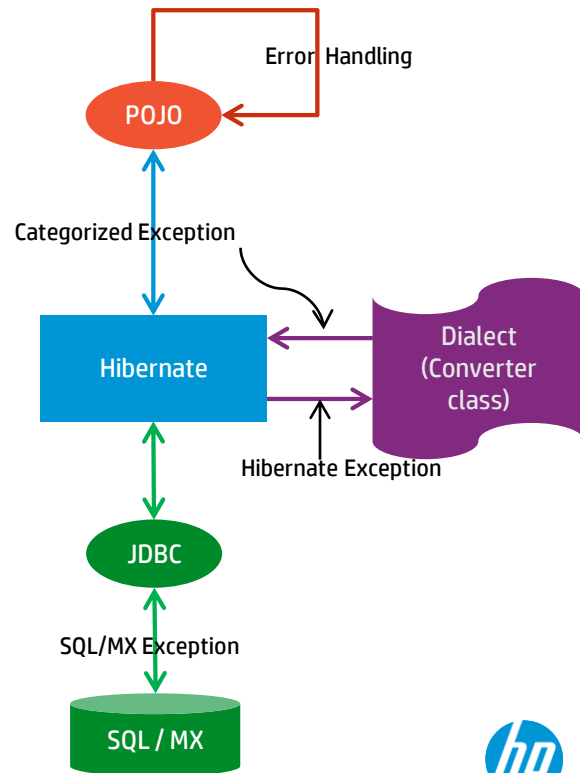
Spring integration with NonStop TMF



Mapping Hibernate exceptions

Error mapping

- With Error Mapping, App developer's code stays same on NonStop as it is elsewhere
- Unchecked Hibernate exceptions are converted to an appropriate JDBCException category using two converter methods in the Dialect:
 - `public SQLExceptionConverter buildSQLExceptionConverter()`
 - `public ViolatedConstraintNameExtractor getViolatedConstraintNameExtractor()`
- Exceptions are categorized into one of one of the following Hibernate subtypes:
 - `JDBCConnectionException`, `SQLGrammarException`, `ConstraintViolationException`, `LockAcquisitionException`
 - Users are able to easily extract the SQL error's sub-category and take remedial/recovery actions



Future enhancements

Dialect for SQL/MX corresponding to new Hibernate Releases

Version updates for Spring, Axis2/J

Samples, Configurations, Guidelines for more Java Open Source Frameworks



NonStop Servlets for JavaServer Pages (NSJSP)



NonStop Servlets for JavaServer Pages (NSJSP) 7.0 (64-bit)

Value-added port of Apache Tomcat



Apache Tomcat is ...

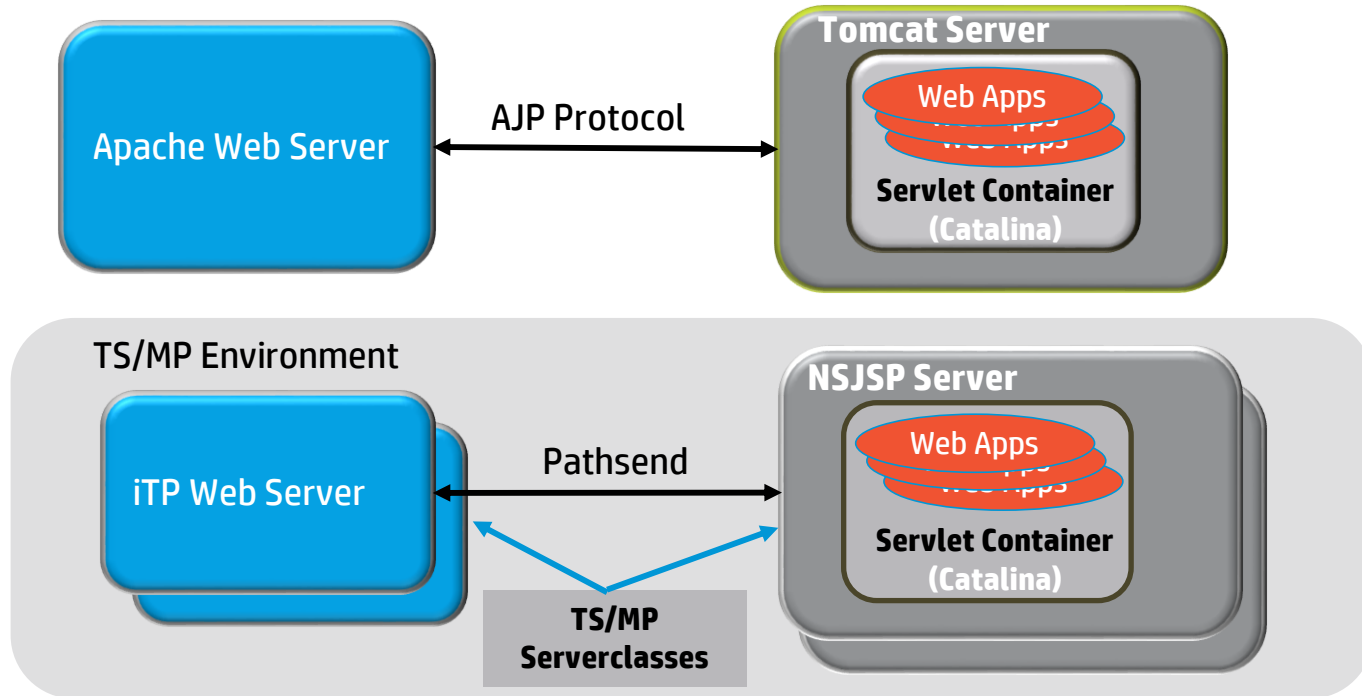
- Open Source
- Market leader in Java app server market
 - >60% of enterprises use Tomcat
 - Used by most Fortune 1000 companies

Tomcat is mature

- World's most popular Servlet Container
- Developed & tested over 10+ years
- Very active development community
- Regular releases with new features + bug fixes

Tomcat vs NSJSP

NSJSP: Standard Tomcat, optimized for scale & continuous availability on NonStop



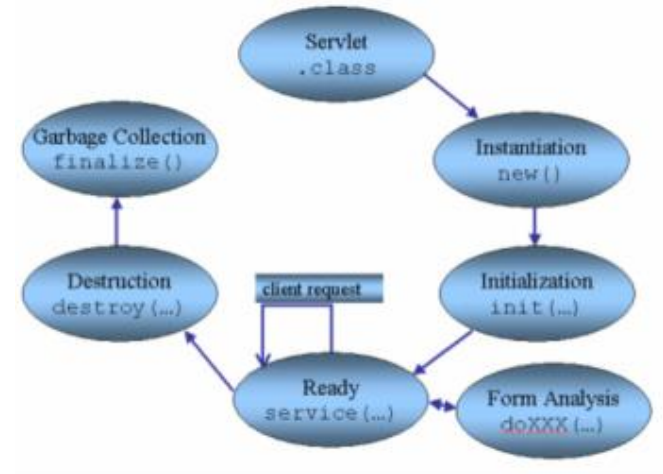
NSJSP 7.0 (64-bit) features

NSJSP 7.0 (64-bit) offers three installation types viz:

- A 32-bit NSJSP installation for NSJ 7 (H06. 26/J06.15 or later)
- A 64-bit NSJSP installation for NSJ 7 (H06. 26/J06.15 or later)
- A 32-bit NSJSP installation for NSJ 6 (H06.23/J06.12 or later)

New Features

- Based on Tomcat 7.0.10
- Complies with Servlet 3.0 Specifications
 - Asynchronous request processing
 - Web Fragments
 - Annotations
- Complies to JSP 2.2
- Unified Management Interface
- Support for SSL attributes, security realms
- Role based Security for administrators



Future enhancements

Improve scalability using shared memory cache

Rebase to most recent Tomcat version

Comply to the latest Servlet, JSP & EL specifications supported by the Tomcat version

Management improvements such as

- Configure alert conditions thru NSJSP Manager
- View logs via NSJSP Manager
- Display additional statistics & health of the container in NSJSP Manager

Installation script enhancements



NSJSP 7.0 (64-bit) Ordering information

- H & J-series
 - NonStop Servlets for JavaServer Pages 6.0 Update 4 is the current software release

Product ID

HSJ88V6 - HP NonStop Servlets for JavaServer Pages 6 Update 4

QSJ88V6 - HP NonStop Servlets for JavaServer Pages 6 Update 4



Ordering Example

- HP NonStop QSJ88V6 - HP NonStop Servlets for JavaServer Pages 6 Update 4, * 2–16 processors
 - Ordering example: for a 2-processor system, order two of QSJ88V6
- Note that the product ordering name for NSJSP 7.0 is HP NonStop Servlets for JavaServer Pages 6 Update 4

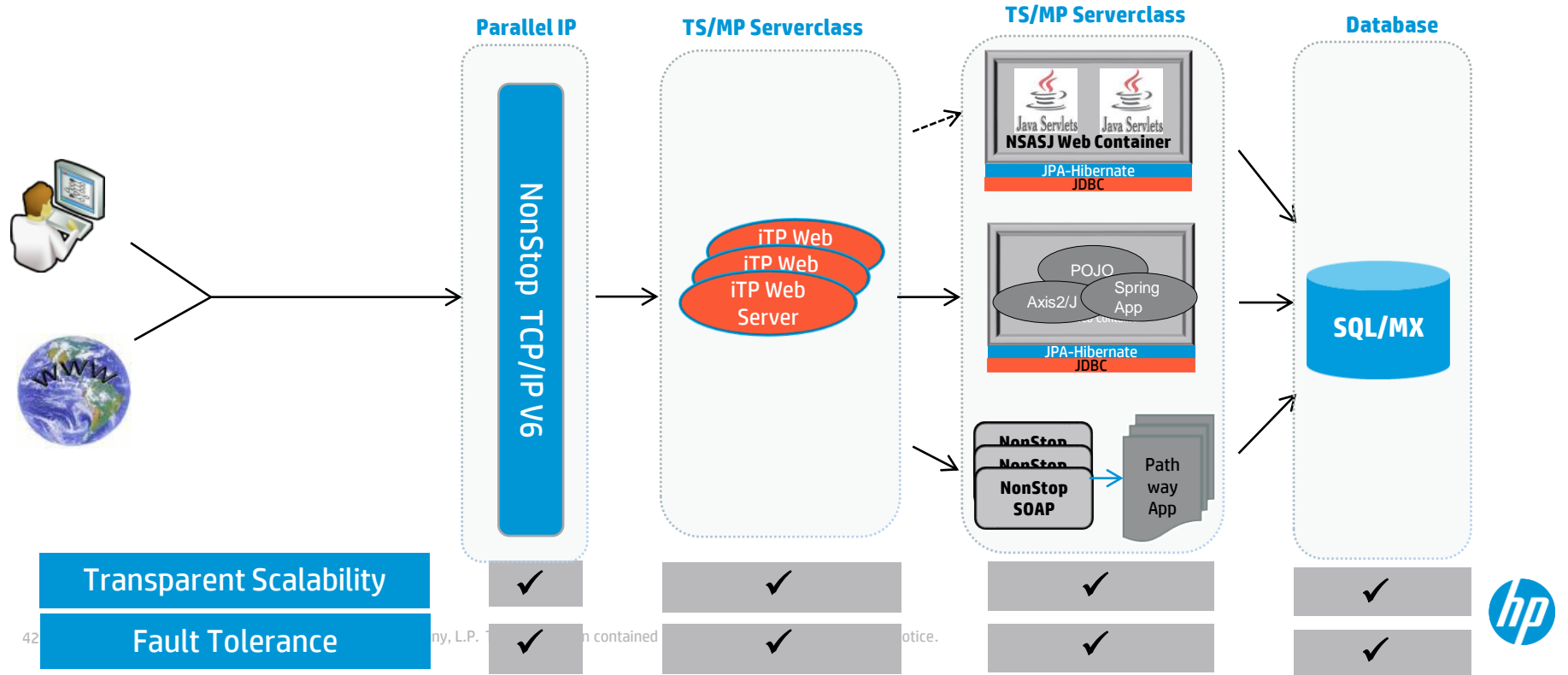
iTP Secure WebServer



iTP Secure WebServer context in NonStop

Gateway to NonStop from WWW & Enterprise networks

- All modern applications rely on HTTP / HTTPS for a highly secure, scalable and available transport layer



iTP Secure WebServer 7.4 features (1...)

Full featured web serving

New Features in release 7.4 (Feb '13)

- Diffie-Hellman Key Exchange Algorithm
- TLS 1.2 Protocol support added
 - A significant enhancement in TLS 1.2 is that the pseudorandom function is specified by the cipher suite now
- Serverclass Renaming
 - HTTPD Serverclass name can be configured
 - Multiple serverclasses can be configured within the same Pathmon

New Features in release 7.4

- Configurable HTTP header maximum size
- Enhanced information logging
 - iTP WebServer 7.4 can be configured to log cookie and CGI variable REMOTE_PORT
 - Logging the remote port information helps track the source of requests
 - Cookie logging enables iTP WebServer logs to be analysed by generally available web traffic analysis software such as Google Urchin.



iTP Secure WebServer 7.4 features (2)

Full featured web serving

Other Features

- RSA Key exchange algorithm
- HTTP 1.1
- TLS 1.0, 1.1, SSL 3.0, Digest access authentication, Certificate authentication, 4096 bit long RSA keys, 256 bit encryption, stronger cipher suites AES & Camellia
- CGI support

Other Features

- Ticketing
- Scalable, continuously available -- runs as Pathway serverclass
 - Support for parallel TCP/IP
 - Multi-threaded – each iTP WebServer instance can concurrently process up to 255 HTTP requests



Future enhancements

Export security keys in PCKS #8 encrypted form

- And also import encrypted keys into our keydatabase

Support for SHA256 hash algorithm

Distinction between Client and Server root, intermediate and leaf certificates

Allow restart of individual serverclasses

Configurable maximum size for HTTP POST messages



iTP WebServer 7.4 Ordering information

- J-series
 - iTP Secure WebServer is available by default on the QSN01 SUT from Q06.15
 - For RVU versions prior to Q06.15 iTP Secure WebServer needs to be ordered using the PID QSJ95 or QSJ98
- H-series
 - iTP Secure WebServer needs to be ordered using the PID HSJ95 or HSJ98
 - HSJ98 for use within the USA
 - HSJ95 for use in rest of the world



Ordering Example

- HP iTP Secure WebServer – HSJ98, * 2–16 processors
 - Ordering example: for a 2-processor system, order two of HSJ98

New XML Parser

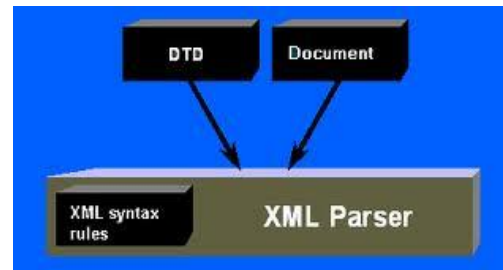


New XML Parser

Salient Points

- T0970 is included in the SUT from RVU version H06.27/J06.16 (Aug '13)
- Based on the latest releases of open source Xerces and ICU# libraries
- Based on Xerces 3.1.1 and ICU version 50.1.2
- Supports both IEEE and Tandem floating types
- New parser is released in addition to the old XML parsers T0535 & T0563
- All new C++ applications are recommended to be developed using the new XML parser

Product T-number	Product Name	Xerces-C++ version	ICU version	Floating-point support
T0535	XML Parser	2.4.0	2.6.1	TANDEM
T0563	XML Parser	2.4.0	2.6.1	IEEE
T0970	XML Parser	3.1.1	50.1.2	IEEE, TANDEM



SOA on NonStop

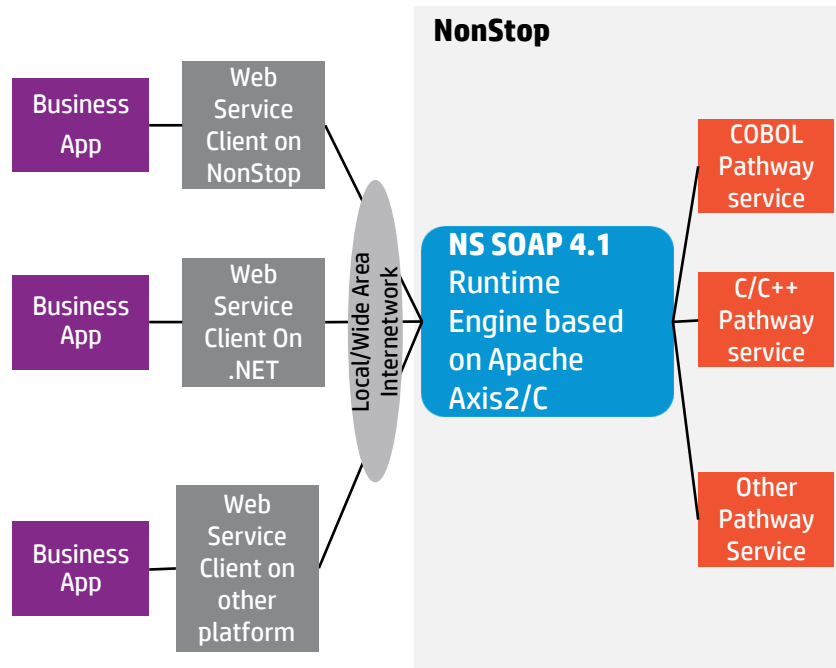


NonStop SOAP 4.1

Leverage valuable Pathway applications from outside of NonStop too

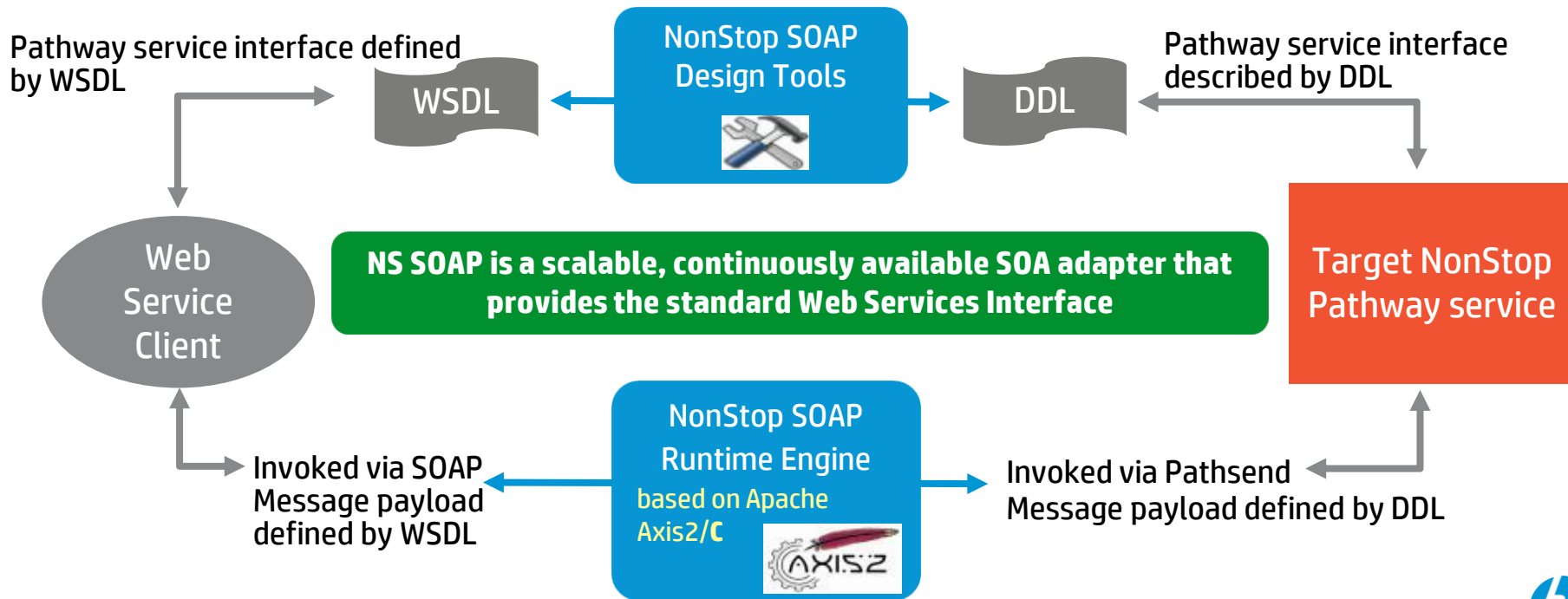
SOAP brings Web Services standards to NonStop

- Pathway services are inherently SOA adherent – except the standard I/F to external world
 - All they need is a Web Services adapter to make them compliant to SOA
- Exposing Pathway services as web services enables:
 - Standards-based interoperability with other apps in the Enterprise & the WWW
 - Service delivery without service consumers needing to know Pathway
 - Existing & new Enterprise services easily achieve scalability and fault tolerance of Pathway while exposing standard an interface



NonStop SOAP 4.1

SOAP engine for web service app development in “C” language
No programming required; No changes to Pathway server



NS SOAP 4.1 components

Design Time Tools

SoapAdminCL tool

- Exposes the underlying TS/MP application or NonStop process as a Web service and generates the corresponding WSDL contract

WSDL2C tool

- Facilitates development of web service components (clients and services) on HP NonStop platform using C programming language, taking an existing WSDL service definition as input

WSDL2PWY tool

- Creates C-language TS/MP application-based Web services from the WSDL contract

Sample code for developing client & server side applications

.....and of course the NS SOAP Run Time engine built on Apache Axis2/C 1.5.0



NS SOAP 4.1 features (1...)

WS-Security related enhancements

Supports SOAP message encryption and signature

WS-Security Policy based configurations

- To secure the web service
- Complies to security policy assertions

Both Symmetric as well as Asymmetric policy bindings

Supports username tokens

- send and verify username with both plaintext and encrypted password
- Allows timestamps to be added to a SOAP message
 - enable the server to verify the message validity

Other Enhancements

WSDL parameter names need not be the same as the DDL field names

- Previously the DDL field names had to be exactly same as in the WSDL

Multiple DDL definitions can be used to create a single request/response WSDL structure

- Enhanced flexibility in mapping DDL to/from WSDL

NS SOAP 4.1 features (2)

Other Features

Compliant to SOAP 1.2 Specs

WS-Security

- X.509 certificates, private keys, digital signatures, symmetric/asymmetric encryptions
- Both Service First & Contract First modes of development
- Out of the box WSDL creation
- Requires no SOAP specific coding
 - Only user's business logic needs to be coded

Other Features

TS/MP scalability & availability

Transaction integrity through TMF

User written plug-ins

- Supports modules/handlers & Message Receiver User functions (MRUF) to modify default message flow
- Can be applied on per-service basis or globally

Hot deployment of new services

- No need to stop SOAP & other services



Future enhancements

Improved compliance to WS-Security

- WS-Secure Conversation support
- Security context per client – server interaction
- New key generation per exchanged message

Support for WS-RM specifications (Reliable Messaging)

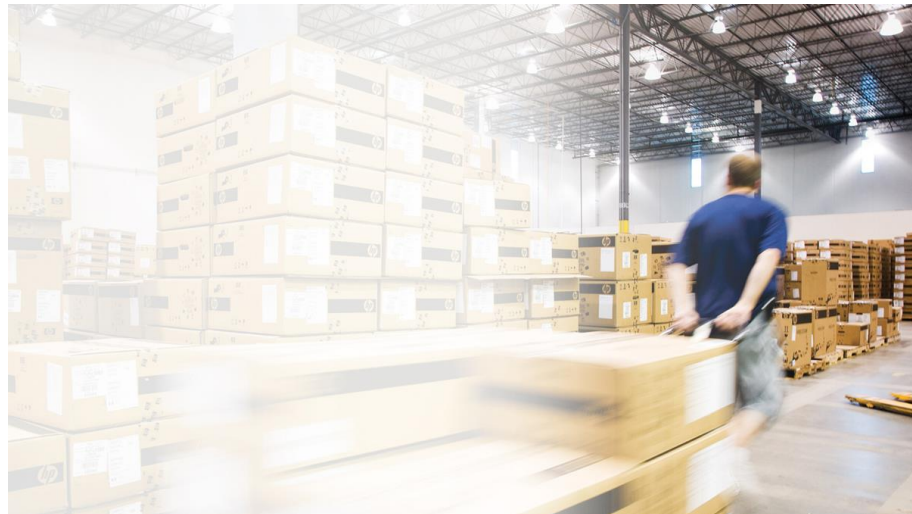
Upgrade of Axis2/C version

Support for MTOM optimised message transfer



NonStop SOAP 4.1 Ordering information

- J-series
 - NonStop SOAP 4.1 is available by default on the QSN01 SUT
- H-series
 - NonStop SOAP 4.1 needs to be ordered using the PID HSX21



Ordering Example

- HP NonStop SOAP 4.1 – HSX21, * 2–16 processors
 - Ordering example: for a 2-processor system, order two of HSX21

Option 2 – SOAP using Axis2/J

HP NonStop offers SOA on Java too

- Axis2/J is the software that is recommended by HP

Axis2/J is open source software from Apache Org

HP tests & certifies Axis2/J on NonStop

- T0874 – This package contains sample apps

Documentation and tools provided for easy deployment

- ddl2java converts DDL information into Java data structures
- java2wsdl converts Java data structures to standard WSDL

Users may download Axis2/J 1.5.2 from <http://axis.apache.org/axis2/java/core/>



Summary



A modern application environment...

...with NonStop fundamentals

Common Standards

- Open APIs
- Open Accessibility
- Open Source Frameworks
- Standard Tools

Uncommon Advantages

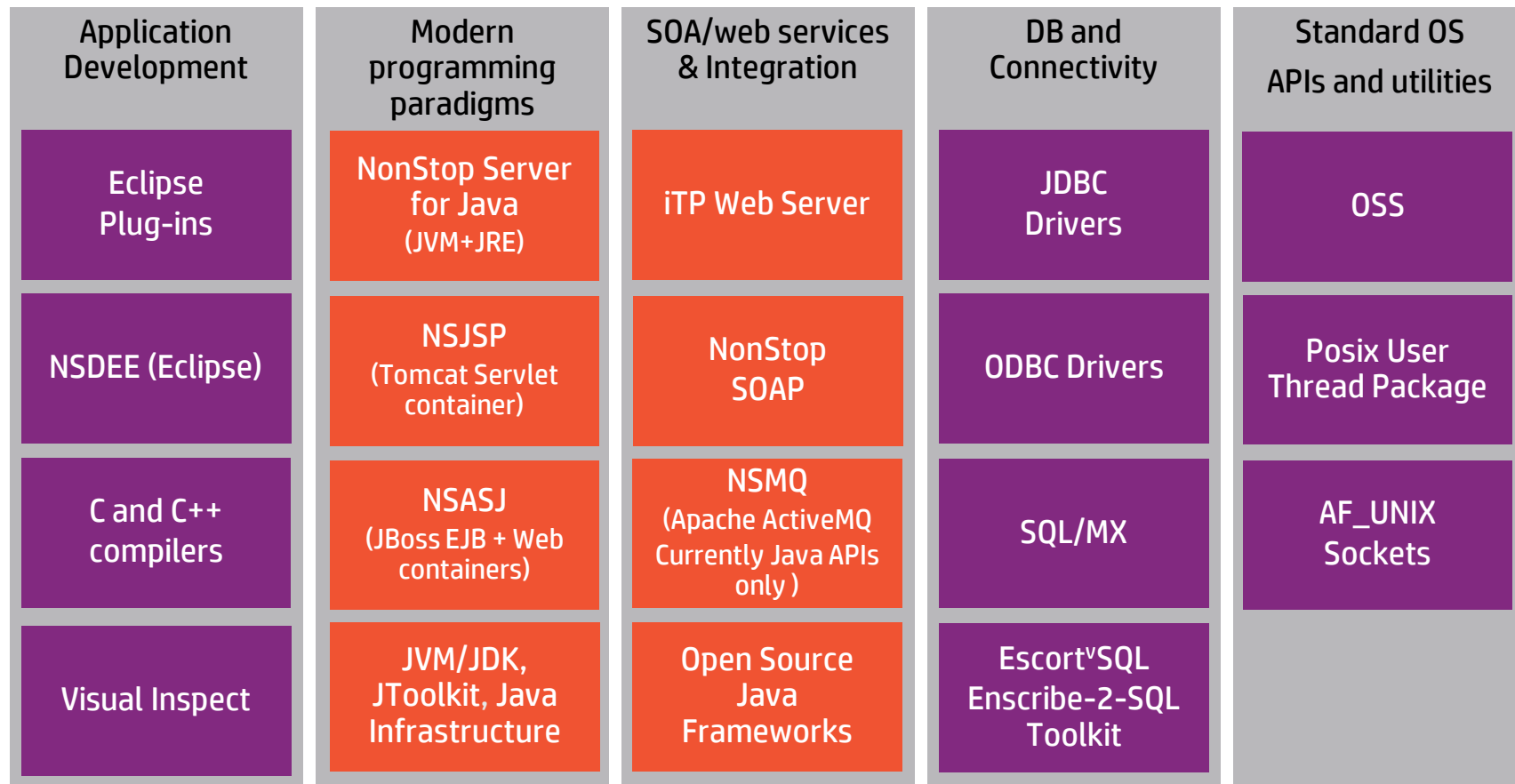
- Highly scalable
- Continuously available
- Easily manageable
- Secure

Develop Application programming models	NSDEE	Open Source Java Frameworks –Axis2/J, Spring, Hibernate & MyFaces			
		NSJSP Servlets, Server Pages, NSASJ EJB & Web containers, NSMQ			
		Standard JDK			
		SOA Infrastructure (iTP WS, SOAP, XML, HTTP, WSDL)			
Deploy Application infrastructure	NonStop TS/MP & TMF, Certified Java SE Platform (JRE), SQL/MX				
	NonStop OS				
Differentiate	Network access	SOA infrastructure	Open source Java frameworks	Business logic	Database
Transparent Scalability	✓	✓	✓	✓	✓
Transparent Fault Tolerance	✓	✓	✓	✓	✓



NonStop modernization toolset at a glance

 Middleware



You **can** realize modernization benefits on NonStop today

Architect your apps using industry standard programming paradigms

Develop your apps using industry standard development tools

Deploy your apps on a highly scalable, continuously available, industry standard app server

Integrate your apps with other apps in the enterprise as SOA services

Connect to your apps using industry standard network protocols

Access your data via industry standard database access technologies

Going forward, existing middleware products will continue to be enhanced and new industry standard toolsets and paradigms supported, while always maintaining NonStop levels of availability and scalability – *transparently!*



Thank you

