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Pathway for the 21st Century - Product update

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July, 2009

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Subjects

• Overall Pathway product strategy
• Announcing TS/MP 2.4!
  – Overview
  – Benefits
• Modernizing Pathway applications
• Future Pathway directions
• Summary

Future product plans, dates, and functionality are subject to change without notice
Overall Pathway product strategy
Pathway with NonStop TS/MP product strategy – high level

• Used by practically every NonStop customer and solution provider across all industries/geographies

• Used internally by many NED products to provide transparent scalability and availability
  – iTP WebServer, NSJSP, NSSOAP, NSTuxedo, NSCORBA, ODBC/JDBC, DSM/SCM, …

*Pathway is considered strategic for existing and new application and solution development on the NonStop server platform. Continued future investment for new Pathway feature/function is planned.*
Pathway with NonStop TS/MP – core product objectives

• Fully exploit increased performance and capacity of Itanium processor by removing Pathway limits
• Increase application availability via planned outage elimination
• Address specific customer requirements and RFEs
• Provide required infrastructure for dependent NED products
• Maintain robustness and usability of product

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Announcing
TS/MP 2.4!

Overview
Announcing TS/MP 2.4

• Designed to exploit the increased capacity and performance of the Integrity NonStop server and reduce planned downtime
  – Builds on new features introduced with TS/MP 2.3

• Principal benefits
  – Easy application upgrade with Pathway domains
  – Large Pathsend message support
  – Performance and capacity increases
  – Miscellaneous RFEs

• Built on Application Cluster Services (ACS) technology
  – Compatible with existing applications

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Announcing TS/MP 2.4

- Generally Available now on H and J series
  - Orderable on RVUs H06.18/J06.07
  - Installable on RVUs H06.16/J06.05 and later
    - Provided T9055 dependency is met

- Product IDs:
  - Q/HSR54 – NonStop TS/MP 2.4
  - Q/HSR78 – Pathway/iTS with NonStop TS/MP 2.4

- No upgrade charge for existing OLC/TLC TS/MP licensees
  - NonStop TS/MP 2.4
    - Order Q/HSR53U at same time as H/QSR54 for credit
  - Pathway with NonStop TS/MP 2.4
    - Order Q/HSR76U at same time as Q/HSR78 for credit
  - Software cancel existing license
Announcing TS/MP 2.4

• Requires NonStop File System (T9055 H07 FILSYS) SPR ^AGN to be installed
  – Standard with RVUs H06.18/J06.07 and later
  – May be installed on RVUs H06.16/J06.05 and later

• Other SPRs required for compatibility with the new ^AGN version of T9055
  – NSSQL
    • SQL/MP T9196H01 ^AFA / SQL/MX T1051H23 ^AJM
  – TS/MP 2.0
    • T8345H01^ABA
  – TS/MP 3.0 (NSTuxedo)
    • T0280H01^ABG

– See the T9055 ^AGN Hotstuff for full details
Who should use TS/MP 2.4?

- Everyone running Pathway on HP Integrity NonStop servers!
  - Anyone requiring maximum Pathway exploitation of HP Integrity NonStop server capacity and performance
  - Anyone running into Pathway limits issues
  - Anyone seeking to reduce planned downtime
  - Anyone requiring new Pathway functionality

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Announcing TS/MP 2.4!

Benefits
Performance and capacity increases (1)

Raised limits

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Version</th>
<th>TS/MP 2.0</th>
<th>TS/MP 2.3</th>
<th>TS/MP 2.4</th>
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<tbody>
<tr>
<td>Server links (/CPU)</td>
<td></td>
<td>1750</td>
<td>4045</td>
<td>8191</td>
</tr>
<tr>
<td>Requesters (/CPU)</td>
<td></td>
<td>1024</td>
<td>CPU limit</td>
<td>CPU limit</td>
</tr>
<tr>
<td>Concurrent Pathsend (/CPU)</td>
<td></td>
<td>1600</td>
<td>4045</td>
<td>8191</td>
</tr>
<tr>
<td>Serverclasses (/CPU)</td>
<td></td>
<td>1024</td>
<td>4045</td>
<td>4045</td>
</tr>
<tr>
<td>Pathway environments (/CPU)</td>
<td></td>
<td>256</td>
<td>4046</td>
<td>4046</td>
</tr>
<tr>
<td>Configuration limits</td>
<td></td>
<td>1x</td>
<td>1x(#Pathmons in domain)</td>
<td>1x(#Pathmons in domain)</td>
</tr>
</tbody>
</table>
Performance and capacity increases (2)

Better control of server distribution via CPU weighting

- Facilitates better overall system performance (cpu utilization)
- Primary CPU Weight factor may be specified for serverclass objects
  - Via ADD SERVER and ALTER SERVER commands
  - CPU Weight displayed on INFO SERVER command
- Directly controls %age of static servers in serverclass started in each CPU
  - CPU Weights specified must add up to 100 for serverclass
  - When CPU Weights are defined, Secondary CPU may not be specified
  - If not specified, current round-robin algorithm will continue to be used
- Indirectly controls number of server links handled by each CPU
  - ^ CPU Weight = more servers on CPU = more links to that CPU
- CPU Weight also affects distribution of dynamic servers
  - Current Pathway server load on the CPU is also a factor

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Performance and capacity increases (3)

Improved rebalancing after cpu reload

• After a CPU reload, with CPU weighting, starting of dynamic servers will automatically favour reloaded CPU
  – Because other CPUs will probably be at or above their target weight, whereas reloaded CPU will be well below it
  – Also because of lower Pathway server load on the reloaded CPU

• For static servers, after a CPU reload, use of Pathway Domains enables Pathmons in the Domain to be serially restarted with no application outage, and with CPU weighting restarting of static servers will also favour reloaded CPU (for same reasons as above)

• Combination of these features enables improved rebalancing of Pathway servers after a CPU reload with no application outage
Online application upgrade (1)

Domains overview

• TS/MP 2.3 introduced the concept of Pathway domains
  – Multiple Pathway environments (PATHMON’s) within a node behave as one application domain
    • Replicated serverclasses across environments
    • Transparent load-balancing across environments by ACS
  – Reduces need for planned outages
    • Take down one environment, others in domain continue processing work
    • Online reconfiguration and rebalancing of Pathway environments
  – Raises single Pathway configuration limits by up to 4x

• TS/MP 2.4 extends this capability to include easy upgrade of server application objects without loss of service
Online application upgrade (2)

Alter running serverclass attributes

- Powerful new PDMI command “ALTER-DOMAIN (pathmon_name) server_name attributes”
  - Alter attributes for all instances of a serverclass across a domain
  - Specified serverclass is frozen/stopped
    - `pathmon_name` specifies first PATHMON in the domain to be altered
    - Requests for this serverclass continue to be processed by other PATHMONs in the domain
  - Specified serverclass is altered according to attributes supplied
    - Any attribute as per `SET SERVER server-attribute` e.g. `PROGRAM {file-name}`
  - In parallel the Altered serverclass is thawed/started, and,
    - Other instances of this serverclass in the domain are frozen/stopped
      - Ensures serverclass remains available for work
    - Stopped serverclasses are altered/thawed/started
      - All instances of serverclass in domain are now altered with same attributes
  - Serverclass never unavailable
  - Attributes of active serverclasses across the domain are always consistent

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Online application upgrade (3)

Synchronous online upgrade for SCOBOL apps

- For inter-dependent attributes of SCOBOL requesters and servers (e.g. request/response message format) changes to both are synchronised
  - Attributes of active requesters and associated servers remain consistent
  - Application always remains available
- To achieve this, 4 new CONTROL commands are introduced
  - CONTROL DOMAIN PARTITION/UNDO PARTITION
  - CONTROL TERM COUPLE/DECOUPLE
  - Within these, use ALTER TCP/TERM/SERVER to alter attributes
  - Similar “rolling change” mechanism as ALTER-DOMAIN
- Supported for PATHTCP4 only
Context-free Pathsend large message support (1)

Overview (1)

- New APIs are introduced to support sending/receiving context-free Pathsend messages <= 2MB
  - Previous limit was 32KB
- New interfaces are widened analogs of existing interfaces with “L” suffix added
  - Apart from widened fields, the semantics are generally the same
  - <tag> size increased from 32-bit to 64-bit
- Language bindings for TAL, C/C++, Java, COBOL
  - Java JPathsend and JPathway interfaces are enhanced to support large Pathsend messages (JToolkit SPR ^AAK available now)
- COBOL
  - Requester and server supported now via COBOL ENTER TAL/C/C++ procedure calls
  - Server COBOL native file I/O routine ($RECEIVE) support available July 2009
Context-free Pathsend large message support (2)

Overview (2)

• NonStop SOAP 3.0 enhanced to use large Pathsend for communication with Pathway server
  • Provides end-to-end large message support for SOAP XML documents for improved utility and performance
    • Service_consumer<>iTTPWS<>NSSOAP<>Pathway_server
  • Includes DDL support for 2MB request/response data structures
  • Available June 2009
    • NSSOAP SPR T0603H01^ABR
    • DDL SPR T9100H01^ABW
• Large messages are not supported for context-sensitive Pathsends or SCOBOL requestors
Context-free Path send large message support (3)

Summary of new APIs

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVERCLASS_SENDL_</td>
<td>Send large message request</td>
</tr>
<tr>
<td>AWAITIOXL</td>
<td>Complete NOWAIT large message calls</td>
</tr>
<tr>
<td>READUPDATEXL</td>
<td>Receive large message</td>
</tr>
<tr>
<td>REPLYXL</td>
<td>Send large message reply</td>
</tr>
<tr>
<td>CANCELREQL</td>
<td>Cancel a large message request</td>
</tr>
<tr>
<td>FILE_GETRECEIVEINFOL_</td>
<td>Get info on large messages</td>
</tr>
<tr>
<td>FILE_COMPLETETEL_</td>
<td>Complete NOWAIT large message calls</td>
</tr>
</tbody>
</table>
Context-free Path send large message support (4)

Compatibility

- Old interfaces continue to be supported and will interoperate with new systems.
- New interfaces where old size limits are respected will interoperate with old systems.
- New interfaces where new size limits are used will only interoperate with new systems.
- New size limits are supported between nodes in ServerNet Clusters only (Expand-over-ServerNet), not Expand-over-IP.
Context-free Pathsend large message support (5)

Details of new APIs (1)

- SERVERCLASS_SENDL_ is widened analog of SERVERCLASS_SEND_
  - Same semantics as SERVERCLASS_SEND except message can be from 0:2097152 (2MB) bytes in length
  - Number of per process concurrent SERVERCLASS_SENDL calls which may be outstanding <= 255
    - Depends upon the length of the messages
    - Current limit of 255 if all messages <= 32KB is maintained
    - Worst case, if all messages are 2MB, 7 calls may be outstanding
    - Plan to increase this limit in the near future
Context-free Pathsend large message support (6)

Details of new APIs (2)

• **AWAITIOXL** is widened analog of **AWAITIOX**
  – Can be used to complete *any* nowait I/O
  – **Must** be used to complete nowait **SERVERCLASS_SENDL** with message length > 32K &| 64-bit <tag>
  – **AWAITIO** can be used to complete **SERVERCLASS_SENDL** messages <= 32K & 32-bit <tag>

• **READUPDATEXEXL** is widened analog of **READUPDATETEX**
  – Can be used to read/respond to *any* I/O
  – **Must** be used to read/respond to **SERVERCLASS_SENDL** request > 32K &| response > 32K
  – **READUPDATE** can be used to read/respond to **SERVERCLASS_SENDL** request <= 32K & response <= 32K
Context-free Pathsend large message support (7)

Details of new APIs (3)

• REPLYX-L is widened analog of REPLYX
  – Can be used to reply to any message
  – Must be used to reply with response > 32K
  – REPLYX can be used to reply to SERVERCLASS_SENDL requests with response <= 32K

• CANCELREQ-L is widened analog of CANCELREQ
  – Can be used to cancel any request
  – Must be used to cancel SERVERCLASS_SENDL requests with a 64-bit <tag>
  – CANCELREQ can be used to cancel SERVERCLASS_SENDL requests with a 32-bit <tag> or no <tag>
Context-free Pathsend large message support (8)

Details of new APIs (4)

• FILE_GETRECEIVEINFOL_ is widened analog of FILE_GETRECEIVEINFO_
  – Can be used to get information on any $RECEIVE message
  – Must be used to get information on SERVERCLASS_SENDL messages > 32K
  – FILE_GETRECEIVEINFO_ and RECEIVEINFO can be used to get information on SERVERCLASS_SENDL messages <= 32K

• FILE_COMPLETEL_ is widened analog of FILE_COMPLETE_
  – Can be used to complete any nowait I/O
  – Must be used to complete nowait SERVERCLASS_SENDL with message length > 32K & 64-bit <tag>
  – FILE_COMPLETE can be used to complete SERVERCLASS_SENDL messages <= 32K & 32-bit <tag>

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Miscellaneous RFEs (1)

• Support for FC/HISTORY/! command
  – PATHCOM
    – Retrieve last 10 commands
  – PDMCOM
    – Retrieve last 99 commands

• Enhanced change auditing
  • Message logged at attempt to change state or configuration of a Pathway application object
    • ALTER/ADD/DELETE/STOP/START commands
    • UserID:Time:Command:Object_type:Object_name:Result
  – Changes via SPI also logged
Miscellaneous RFEs (2)

• More efficient PATHMON link handling
  – PATHMON will no longer search through all servers when no links are available
  – Link rejection no longer considered a permanent error
    • Timer based retry mechanism

• CREATEDELAY granularity increased
  – May be specified in centi-seconds
Miscellaneous RFEs (3)

• PDMCOM domain level commands
  – Operates on all PATHMONs within the domain
  – Simplifies domain level operations instead of having to deal with each PATHMON in the domain independently
  – OPEN <domain_name>
    • Opens all PATHMONs in the domain
  – CONTROL DOMAIN PARTITION/UNDO PARTITION
    • Used when altering dependent TERM/SERVER domain object attributes
  – STATUS DOMAIN <domain_name>
    • Returns status on the domain (partition status, config info, …)
Miscellaneous RFEs (4)

Improved ACS Availability and Recovery

1. Obviate need to restart all requesters in CPU after ACS abend

- Previously, after an ACS abend, all Pathsend requesters in the CPU had to be restarted in order to reconnect with restarted ACS ROUT process
- With this change Pathsend requesters automatically reconnect with restarted ACS ROUT process, and do not need to be restarted
- Application requirements
  - All outstanding Pathsends must be completed with AWAITIOX or cancelled with CANCELREQ before new Pathsends will succeed
    - Otherwise new Pathsends fail with Pathsend error 947 (error in ROUT connection) and file system error 201 (path down)
  - Application may have to retry new Pathsends until ACS ROUT process has been restarted
    - Otherwise new Pathsends fail with Pathsend error 947 (error in ROUT connection) and file system error 14 (process inaccessible)
  - Application protocol documented in Pathway and JToolkit manuals
Miscellaneous RFEs (5)

Improved ACS Availability and Recovery

2. Automatically restart ACS (ROUT) after abend

- Previously after an ACS abend, ACS has to be restarted manually
- With this change after an ACS abend, ACS will be restarted automatically

- Both RFEs will be available as SPRs for TS/MP 2.3 and 2.4, and 2.1 (G-series only)
- Dependent on T9055 LINKMON FS SPRs
  - Documented in TS/MP softdocs
- JToolkit SPR will also be available
Modernizing Pathway applications
Aspects to modernizing classic NonStop apps (1)

• **Green Screen modernization**
  – Re-face existing applications with modern GUI (browser/desktop based)
  – Makes it easy to train end-user workforce, easier to maintain application

• **Database modernization**
  – Get existing Enscribe data into NonStop SQL relational form
  – Lowers development cost, improves data accessibility, enables data to be readily used in new ways

• **Integrate NonStop apps with other enterprise applications**
  – Make existing applications and data accessible from heterogeneous platforms and applications using standard interfaces and protocols
  – Eliminates “islands of information”, new business processes can be deployed faster

• **Implement new business logic using modern programming languages and paradigms**
  – More productive programmer workforce
  – Lowers application development and maintenance costs
Aspects to modernizing classic NonStop apps (2)

Structure of classic NonStop application

Green Screens
SCOBOL (UI logic)
Cobol Pathway Servers (Business logic)
Enscribe (Database)

NonStop Modernization Toolset

Enterprise Application Integration
Browser/Native Desktop UI
Servlets/Web Service
Java Business Services
NonStop SQL (Database)

Structure of modernized NonStop application

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Green screen modernization

- **Toolset**
  - SOA products, Java products, Partner products

- **SOA products enable customers to**
  - Expose Pathway services as standard Web Services with **NonStop SOAP**
    - Defined using GUI wizard, no programming required on NonStop
    - Invoke these standard Web Services from GUI apps, like VB .NET

- **Java products enable customers to**
  - Develop web-based presentation services using standard Java APIs – Servlet and JSP
  - Further simplify development by using widely adopted open-source frameworks – Spring and Apache MyFaces
  - Run the Java presentation logic on value-add port of Apache Tomcat – **NonStop Servlets for JSP**
  - Access Pathway services from Java presentation services – **JToolkit (JPathsend/JPathway)**

- **Partner products provide additional options**
  - Cornerstone’s **RSC**, comForte’s **CSL Studio**, CAIL’s **CAIL Studio**, NuWave’s **SOAP/AM**, Crystal Point’s **AppViewXS**
Pathway web services – using NonStop SOAP or Java

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Database modernization

- **Toolset**
  - NonStop SQL, Connectivity products, Partner products

- **NonStop SQL**, relative to Enscribe, enables customers to
  - Use an industry standard relational database for their operational data
  - Lower development cost with reduced programming and leveraging 3rd party products, like Crystal Report
  - Increase accessibility to data with industry standard access technologies
  - Improve app uptime and have extremely large database

- **Partner products** enable customers to migrate Pathway Enscribe-based apps to NonStop SQL-based apps using an incremental approach
  - Escort SQL from Carr Scott Software
  - Enscribe-2-SQL Toolkit from TANDsoft

*Future product plans, dates, and functionality are subject to change without notice*
Integrating Pathway apps with other enterprise apps

• Expose Pathway servers as standard SOA and web services using NonStop SOAP or Java toolset
  – Pathway app now accessible from any program, running anywhere, using standard WSDL/SOAP/HTTP service invocation

• Partner product (IBM WebSphere MQ) enables customers to
  – Use reliable messaging for application integration
    • MQ app on client system enqueues message to MQ queue on NonStop system
    • MQ app on NonStop system dequeues message and processes (invoking Pathway servers etc as required)
Implementing Pathway apps using modern programming languages and tools (1)

- Toolset
  - App development tools for modern languages, industry standard IDE
- With support for modern languages customers can
  - Develop Pathway apps in their language of choice – C, C++, Java, COBOL
  - JToolkit provides support for Pathway apps written in Java
    - JPathsend (requester)
    - JPathway (server)
- An industry standard development environment (open-source Eclipse) enables developers to
  - Compile, Build, and Deploy-to-NonStop Pathway applications, from the desktop, with NonStop Enterprise Plug-ins for Eclipse

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Implementing Pathway apps using modern programming languages and tools (2)

• Excellent reference white paper, “Bringing Pathway development to the 21st Century”
  – How to use OSS and Open Source tools
    • OSS enables use of standard POSIX and Open Source tools, compilers, and utilities, to boost programmer productivity
  – How to use Eclipse and NonStop EPE
    • Workstation based standard IDE helps obviate need for specialised developers to create Pathway applications
Future Pathway directions
Enhancements being considered for future Pathway releases

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• Large message support for Pathsend dialogs for improved SOA/web-services efficiency
  - Dialogs are used between iTPWS and NSSSOAP/NSJSP

• SPI support for PDMCOM commands

• Further link management enhancements

• Planned outage elimination phase 3 – avoid application outage when NonStop node taken out of service
  - Pathway domains across nodes
    - Logical Pathway serverclasses span NonStop systems
  - Take one system down for maintenance/upgrade, other system remains available for work

• Additional RFEs
  - Raise GDSX transaction limit; Support node independent DEFINEs; …
Summary

- New TS/MP 2.4 release GA now
  - Easy online application upgrade with Pathway domains
  - Large Pathsend message support
  - Performance and capacity increases
  - Miscellaneous RFEs
- Modernize your Pathway applications to unlock value
- Significant Pathway enhancements planned going forward

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Further information

• Pathway with TS/MP 2.4 product data sheet

• TS/MP 2.4 Release Supplement
  – Provides release content overview and migration considerations
  • [http://www.docs.hp.com/](http://www.docs.hp.com/)

• White paper, “Bringing Pathway development to the 21st Century”

• NonStop Systems Certification - new Pathway exam
  • NonStop Pathway TS and TS/MP (HP0-A13)
  • Available Aug 15, 2009
Thank you!

Questions?