HP Integrity NonStop X

NonStop fundamentals on Industry Standard Hardware

Prashanth Kamath U/ April 28, 2015

Forward-looking statements

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

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The beginning of a new family of NonStop products

Introducing HP Integrity NonStop X: redefining availability and scalability for x86

In the past ←

NonStop Itanium

- Intel® Itanium® processor
- Proprietary interconnect
- Massive scalability
- Highest AL4 availability

100% HP NonStop

Available Today! →

NonStop Itanium	NonStop X
Intel® Itanium® processor	Intel® Xeon® processor
Proprietary interconnect	Industry-standard interconnect
Massive scalability	
Highest AL4 availability	

NonStop X: The only fully-integrated, fault-tolerant compute for x86 solutions

HP Integrity NonStop X Server – NS7 X1

- Expands the HP NonStop product family
- Intel ® Xeon® x86 microprocessor
- InfiniBand is the system interconnect
- 4-cores enabled per CPU
- Half-height blades - more CPUs per chassis and potential smaller footprint
- c7000 chassis
- 10GB Ethernet
- Supports LTO-6 Tape Drives
- Supports larger memory configurations – from 64 GB to 192 GB
- Leveraged CLIM I/O architecture
- Software price held at NB56000c rates

NonStop X delivers massive scalability

For growing business performance

More scalability than any x86 server

>25x increase in system interconnect capacity for responding to business growth needs

Up to **50%** performance capacity increase to handle higher transaction volumes

Near-linear scalability, online without application outage, for handling transaction volume

The NonStop X software stack

All layers of the software stack have been optimized for HP Integrity NonStop X

APPLICATIONS

Modern application development tools	NSDEE (Eclipse) + compilers are modified for x86.
Middleware	Middleware products work as they did on Intel® Itanium®
Database and transaction management	HP NonStop SQL/MX and SQL/MP
System management and control	Rich suite of manageability products
Security	Security is included with the OS, modified to run in x86 Native mode.
NonStop Operating System	The NonStop OS is optimized for x86 and InfiniBand.

HARDWARE

NonStop X Hardware and Software

Summary

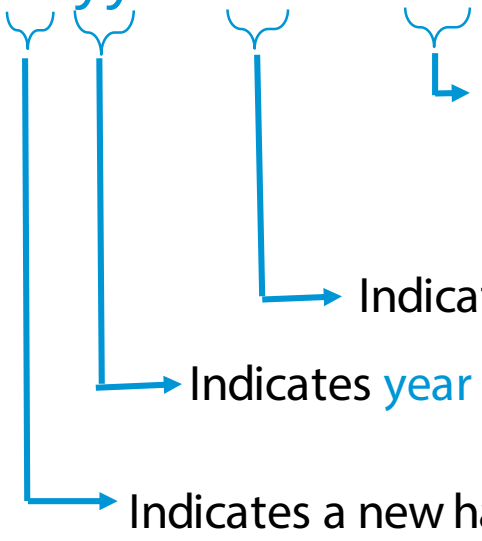
- HP continues to offer the integrated stack for scalable and available Mission Critical applications
- Protect your investment in contemporary and legacy software
- New terminologies
  - NonStop X platform will run the new L-Series OS
  - Native programs on NonStop X will be referred to as *TNS/X* programs
  - Native objects are referred to as *code 500* objects

New in NonStop X

New RVU Naming for L-Series

Why this change?

L<yy>.<mm>.<nn> → L15.02.00 (Example)



Indicates that the RVU was revised after PRG occurred. The change important that all new orders for L15.02 would be fulfilled by L15.02.01 as the new default to insure all customers receive the revised RVU.

Indicates month when the RVU was planned for release

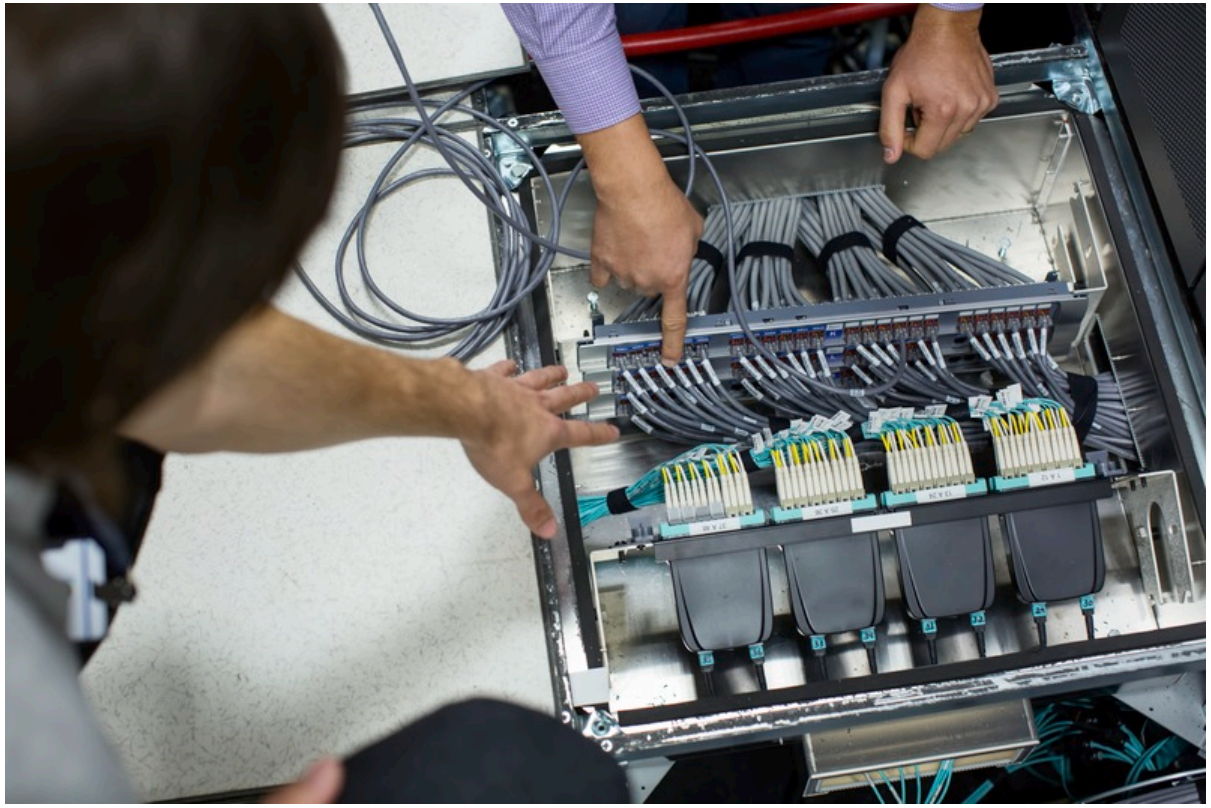
Indicates year when the RVU was released

Indicates a new hardware chip technology (x86).

- Make it easier to discern the age of a particular RVU at a glance
- Eases communication between HP and Customers on subjects such as system upgrades, support or support extensions.
- Aligns NonStop release names to those of other servers in the HP Mission Critical BU

NonStop Operating System

- OS bundle now contains
  - NonStop SSH
  - NonStop SSL
  - XYGATE User Authentication
  - XYGATE Merged Audit
  - NonStop TimeSync
- OS Enhancements
  - One Message System Interrupt Process per IPU
  - DP2 Enhancements
    - Supports maximum SQLMXBuffer size to 2GB
    - Cache size has increased from 1 GB to 1.4 GB
  - TimeSync enhancements to calibrate system clock-rate



New product releases in NonStop X

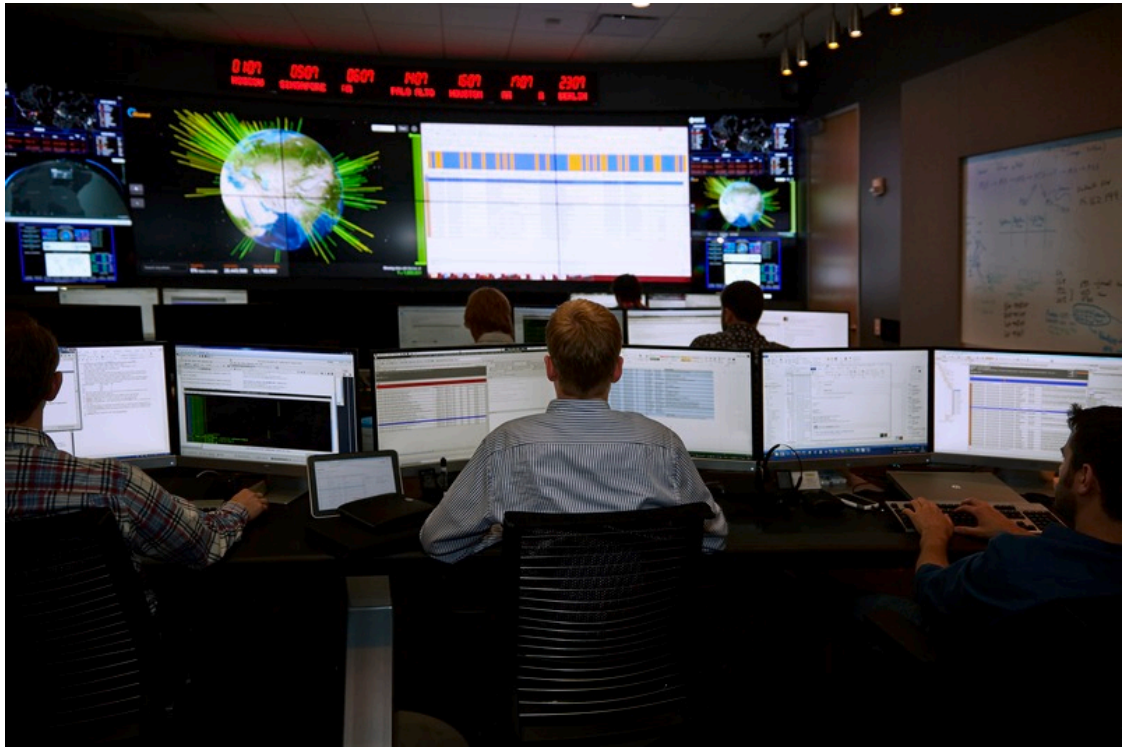
- SQL/MX 3.3
- NSDEE 5.0
- Manageability
  - NonStop Software Essentials 4.0
  - IRS 7.3 for remote support
  - CLIM based receive dump
- Others
  - TS/MP performance enhancement
  - NonStop SSL
  - XMA

HP NonStop SQL/MX 3.3

- Online mxci help
- MXDM support for create/alter database objects, manage data sources
- A health check tool for NonStop SQL/MX
- Closer integration with Safeguard
  - Delete User protection
  - Comply with Volume ACLs and Display Object permissions
- BR2 enhancements
  - Schema and table names could differ
  - No need to pre-create Catalogs for a Restore operation
- Query Plan Quality Improvements
- Executor performance enhancements – 64 bit EID

NonStop X – Manageability

- OSM
  - New Tools replacing OSM Low Level link functionality
  - CLIM Receive Dump
- NonStop Software Essentials 4.0
  - Supports NonStop X
  - Package product files into a Distribution Subvolume
  - Enhancements to reporting functionality
- Insight Remote Support (IRS) 7.3
  - Supports NonStop X
  - Replaces Insight Remote Support Advanced



NSDEE 5.0 Features

- Supports HP Integrity NonStop X
- Supports Eclipse 4.3 (Kepler)
- Simplified installation
- Support for TS/MP application launch
- More VI-Equivalent Features
  - Program-initiated debug launches (eg. rund, runv, call DEBUG, etc.)
  - Examine Open Files and Memory Segments
  - Examine NonStop-specific load module attributes
  - Display variables as NonStop OS types (eg. process handle, system number, etc.)
  - Debug privileged code with a warning indicator
- Parsing of NonStop keywords in header files

Product Availability

Includes HP price-book products

- All SUT based products are ready
- Most Independent Products (IPs) are ready; remaining will be ready in few weeks
- Many ISVs have already ported their solutions to NonStop/X
  - Ask your ISV about their plans for NonStop X support, if they are not ready yet
- TNS/X infrastructure is available at the ATC
- Some legacy software is not supported on L-series
  - Products with low customer base have not moved forward (e.g. NET/MASTER, Pathmaker, Tuxedo)
  - Non-CLIM based protocols (e.g. SWAN, SNAX)
  - Multiple products offering similar solution; go-forward product is supported (e.g. ETK and VI are not supported)

Migrating applications to NonStop X

Developer Tools support on TNS/X

Languages	• Native: C/C++, COBOL, pTAL • Java
(Cross)Compilers	• C/C++, COBOL, pTAL
Preprocessors	• SQL/MX, SQL/MP
IDE	• NSDEE

Languages	• Native: C/C++, COBOL, pTAL • Non-native: C/C++, COBOL, TAL, FORTRAN • Java
Compilers and RTL	• Native: C/C++, COBOL, pTAL • Non-native: C/C++, COBOL, TAL, FORTRAN
TNS/E Cross Compilers	• C/C++, COBOL, pTAL
Preprocessors	• SQL/MX, SQL/MP
Debuggers	• Native Inspect, Inspect
Supporting tools	• Code coverage, PGO, xnoft, tnsvux

Targeting source programs…

- TNS/E code needs to be recompiled for TNS/X
  - Most valid programs will not need any source modifications to migrate from TNS/E native to TNS/X native
  - The "same" frontends are used for TNS/X as are used for TNS/E
  - Compilers and OS present a big endian byte layout to application programs
    - The compilers byte swap data items before placing them into memory for program variables
    - Does not apply to non-program variables such as return addresses pushed onto the memory stack
    - The OS along with the debuggers make the view complete
  - Allows for binary data to be exchanged between Itanium and x86 systems without any special handling
- Non-native programs run 'as is' in interpreted mode on the new platform without any change
  - You may accelerate non-native programs using Object Code Accelerator (OCAX)

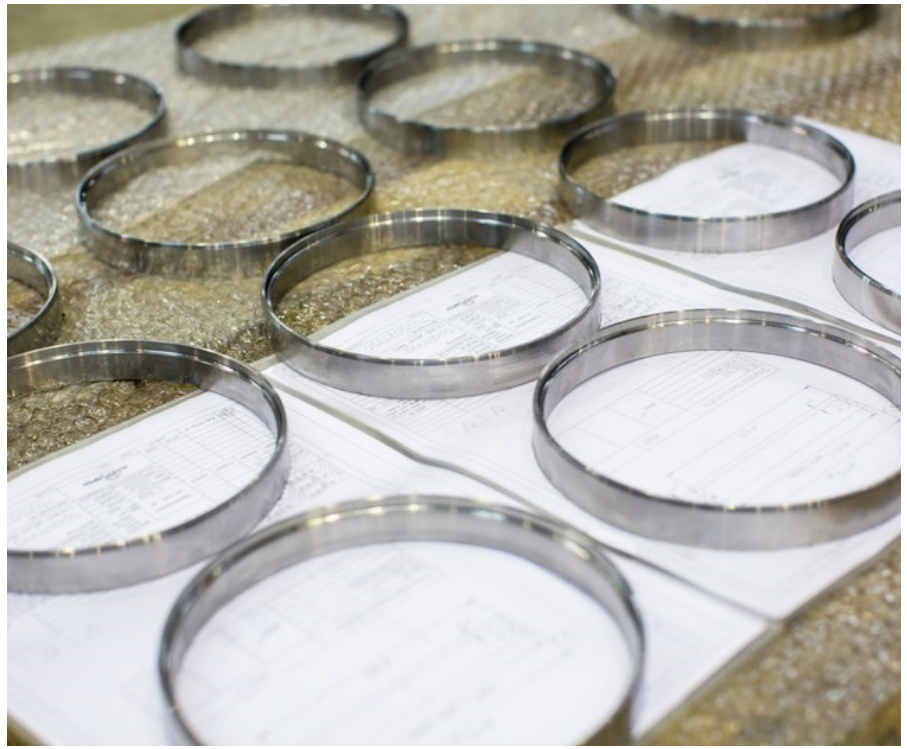
Targeting source programs

- Programming notes
  - Look for conditional compilation macros such as _TANDEM_ARCH_ or _TNS_E_TARGET_ to examine if requires to be modified for TNS/X.
  - There is a new back end – increases the chance that ("erroneous") code that makes the wrong assumptions about how code is generated may produce different results
  - Build scripts may need to be modified
    - Some of the compilers and tools have changed – or some command line options have changed.
    - Examine the scripts for similar target specific macros as mentioned above.
- For more information, refer the L-Series Application Migration Guide to help with software migration
- If you have a G-Series application to be migrated to TNS/X, refer the H-Series Application Migration guide before the L-Series migration

Porting Applications to NonStop

Software Level Dependencies

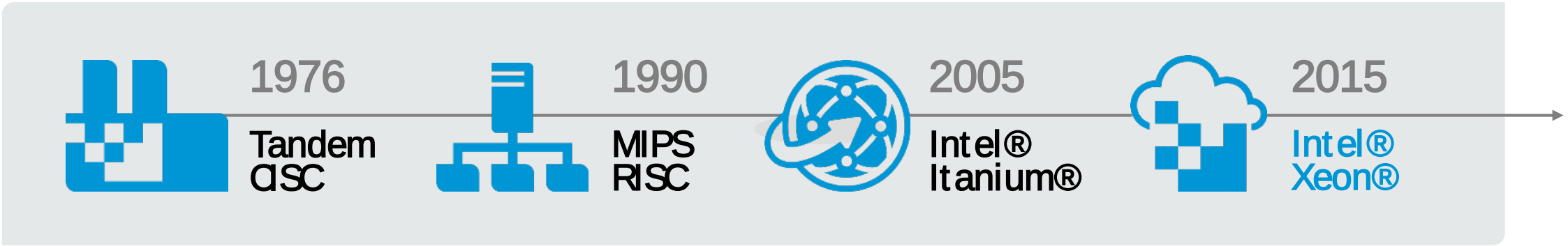
- You may need to move the solution from an earlier version of software on J-Series to its latest version on L-Series
  - Example 1 – Move SQL/MX database to version 3.3
  - Example 2 – Move the TS/MP environment to version 2.5
- Some software you used in the J-Series are not available in L
  - Example 1 – Tuxedo
  - Example 2 – Pathmaker
  - Example 3 - SNAX
- ISV software
  - Contact your software vendor for any non-HP products for their availability on the L-Series



Deploying existing applications on NonStop X

NonStop has successfully transitioned to new processor technologies in the past

NonStop processor technology introductions



HP NonStop has a credible track record of evolving through newer platform architectures

Learnings applied on NonStop X have led to further improvements in the migration experience

NonStop X Beta Program

Some ISV participants

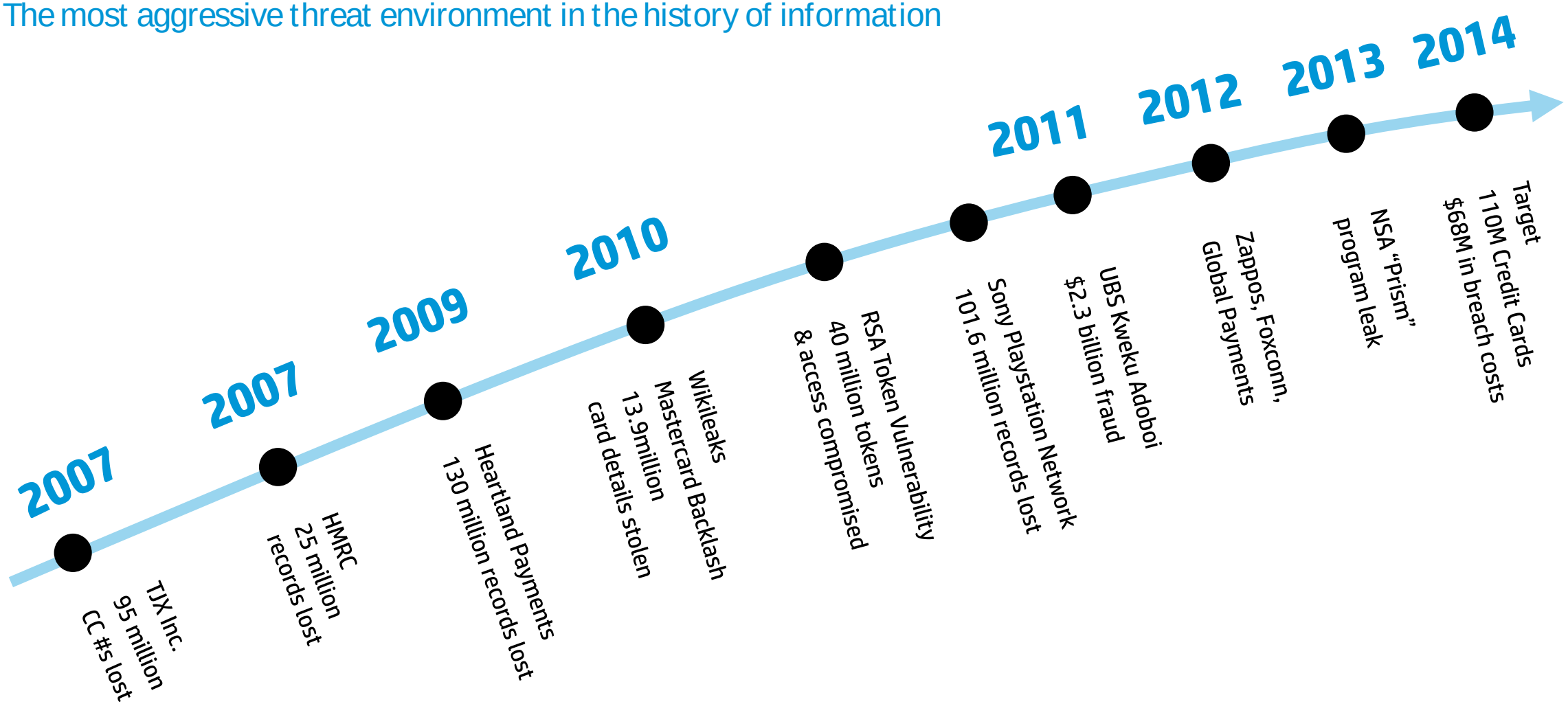
"NonStop X brings the Intel® Xeon® processor to the NonStop OS and delivers significant performance improvements. We expect the new NonStop X system to deliver an advantage in the mission-critical Big Data era."

Dai Nakajima, Head of System Integration Division, Daiwa Institute of Research Business Innovation

HP NonStop Security

Rise of the Cyber Threat

The most aggressive threat environment in the history of information



Addressing Security threats

NonStop Architectural advantages

- Greatly reduces both the potential of importing malevolent software and its effects on the system
- Restrictions imposed through
  - Privileged vs. non-privileged users and code
  - Memory access
- References on NonStop security
  - HP NonStop security overview – www.hp.com/go/nonstop/security, under White Papers (Technical)
  - HP NonStop security hardening guide

Security Vulnerabilities

HP Policy

- NonStop security vulnerabilities are rare, but they do occur
  - We follow the HP security vulnerability notification policy and process
  - We issue both an HP Security Bulletin and a NonStop Hotstuff if there is a serious security issue
- The HPSB and Hotstuff
  - Notify customers of the existence and general nature of a security vulnerability
  - Provide a CVE identifier and a CVSS base score (see www.first.org/cvss)
  - Identify the affected release(s)
  - Identify the TCF(s) to download
- Customer communication
  - For vulnerabilities in our own code, HP normally does not announce until TCFs are available for the supported affected releases
  - To avoid identifying potential exploits, we do not publish details of the vulnerability
  - For vulnerabilities in externally-sourced code, HP now publishes partial information in advance of TCF availability

Managing security vulnerabilities

What HP Does

- Monitor news and events
  - Track vulnerability announcements
  - Review customer alerts
- Prepare a plan of action
  - Identify affected products / versions
  - Build spreadsheets to track affected systems/products
  - Prepare an remediation and communication plan
- Execute on the plan
  - Start implementing fixes
  - Write summary Hotstuff
  - Write individual Hotstuffs as needed
  - Write HP Security Bulletins as needed
  - Test and release fixes
  - Update Hotstuffs and HPSBs

Managing security vulnerabilities

Recommended actions for customers

- Monitor news and alerts
  - Follow the IT media
  - Read Hotstuffs
  - Read HP security bulletins
- Assess their impact
- Plan and execute preventive and/or remedial actions
  - Build spreadsheets to track affected systems/products
  - Apply mitigations
  - Collect TCFs
  - Schedule installation
  - Notify customers of any expected disruption
  - Install TCFs

PCI-DSS 3.1

Key recommendations

- PCI released the 3.1 revision 'mid-way' through their regular release schedule
  - Primarily to remove SSL and early versions of TLS from the standard
- Stop using SSLv3
  - As of J06.18 the NonStop SSL default min version is set to TLS 1.0; the SPR is portable on earlier RVUs.
  - You need to explicitly lower it, should you need to support SSLv3
- Use a more recent version of TLS 1.1; consider 1.2
- Plan to migrate off of SSLv3 and early TLS version before June 30, 2016
  - Have risk mitigation plan until then

Thank You

References

- HP Integrity NonStop Systems – www.hp.com/go/nonstop
  - NonStop X Solution overview
  - Product datasheets
- HP Support Center – www.hp.com/go/nonstop-docs
  - L15.02 compendium
  - L-Series Application Migration Guide
  - User manuals
- NonStop eServices Portal www.hp.com/go/nonstop/eservices/nep
  - Scout – Download SPRs, refer Softdocs
  - SDRC – Order SUT and IP DVDs

For more information, contact Prashanth Kamath U (p.kamath@hp.com)

ITUG Libraries

- ITUGLIB (http://ituglib.connect-community.org/) has open source packages contributed by members
  - Used by customers and ISVs in their environments
  - Many of these packages are now included in the OS
  - Based on the download statistics, about 40 are most popular
- For NonStop X
  - About 25 packages have been ported for the ISV/Customer Beta; some more ports are underway
  - Customers/ISVs can post requests directly at ITUGLIB for other packages
- Caveat – these ports are done by volunteers (including from HP) and HP offers no warranty

C/C++ Compiler

Compiler command line

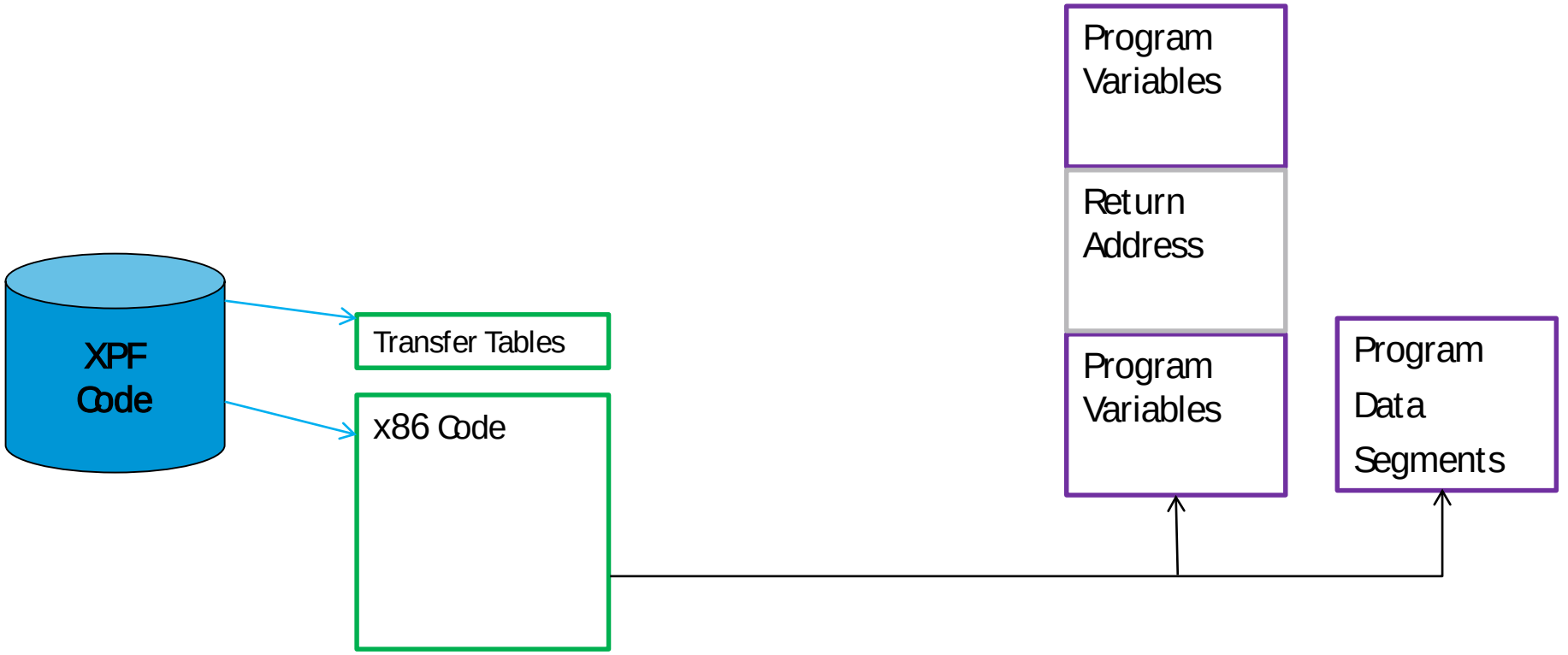
- SAME: The commands to invoke the TNS/X C/C++ compiler are the same as in TNS/E:
  - Guardian
    - CCOMP for C compilation
    - CPPCOMP for C++ compilation
  - OSS & Windows
    - c89 for C (1989 standard) and/or C++
    - c99 for C (1999 standard) and/or C++
- NEW: Options to specify the target of the compilation:
  - CCOMP/CPPCOMP TARGET TNS/X | X86 – (default) generates TNS/X linkfile
    TARGET TNS/E | IPF – generates TNS/E linkfile
  - c89/c99 -Wtarget=tns/x | x86 – (default) generates TNS/X linkfile
    -Wtarget=tns/e | ipf – generates TNS/E linkfile

Native Programs

big-endian
little-endian

Back

- Emulating a Big-Endian Architecture on a Little Endian Machine



Native execution stack stores both big- and little-endian elements

C/C++ Compiler

"Invalid" or "erroneous" programs

- C/C++ programs that rely upon behavior that the standards define as "undefined" and/or "unspecified" are not considered to be valid programs
- They may require code changes when porting to TNS/X
- In some instances the undefined behavior may only be exposed at higher optimization levels
- Some examples of undefined behavior we have actually seen include:
  - Use of undefined (uninitialized) variables
  - Functions that do not always return a valid return value
  - Loading/storing volatile data without explicitly declaring the variable or expression to be volatile
  - Depending upon the evaluation order of operands in instances where the standards says the order is not specified
  - Relying upon the specific implementation of va_list instead of treating va_list as a fundamental type

NonStop X Beta Program

- HP NonStop X ran an x86 Beta Program with NonStop partners
  - Testing began in December of 2013
  - Companies had to migrate their products(s)/applications to run on NonStop x86
  - About 36 companies tested on the platform successfully
- The Beta Program included selected NonStop customers, began September 2014
  - Customer migrated their code
  - Systems used were hosted at the ATC
  - Completed testing in December 2014 (then January 2014)
- POC - ATC available beyond beta as part of our regular business process
-