



NonStop Servers – The future

Derek Ginger
Field Support



Enterprise Systems Group (ESG)

- servers
- storage
- software
- solutions

HP services (HPS)

- customer support
- managed services
- consulting and integration
- solutions expertise

Personal Systems Group (PSG)

- desktops
- workstations
- notebooks
- emerging technologies

Imaging & Printing Group (IPG)

- consumer/business printing
- digital imaging
- digital publishing

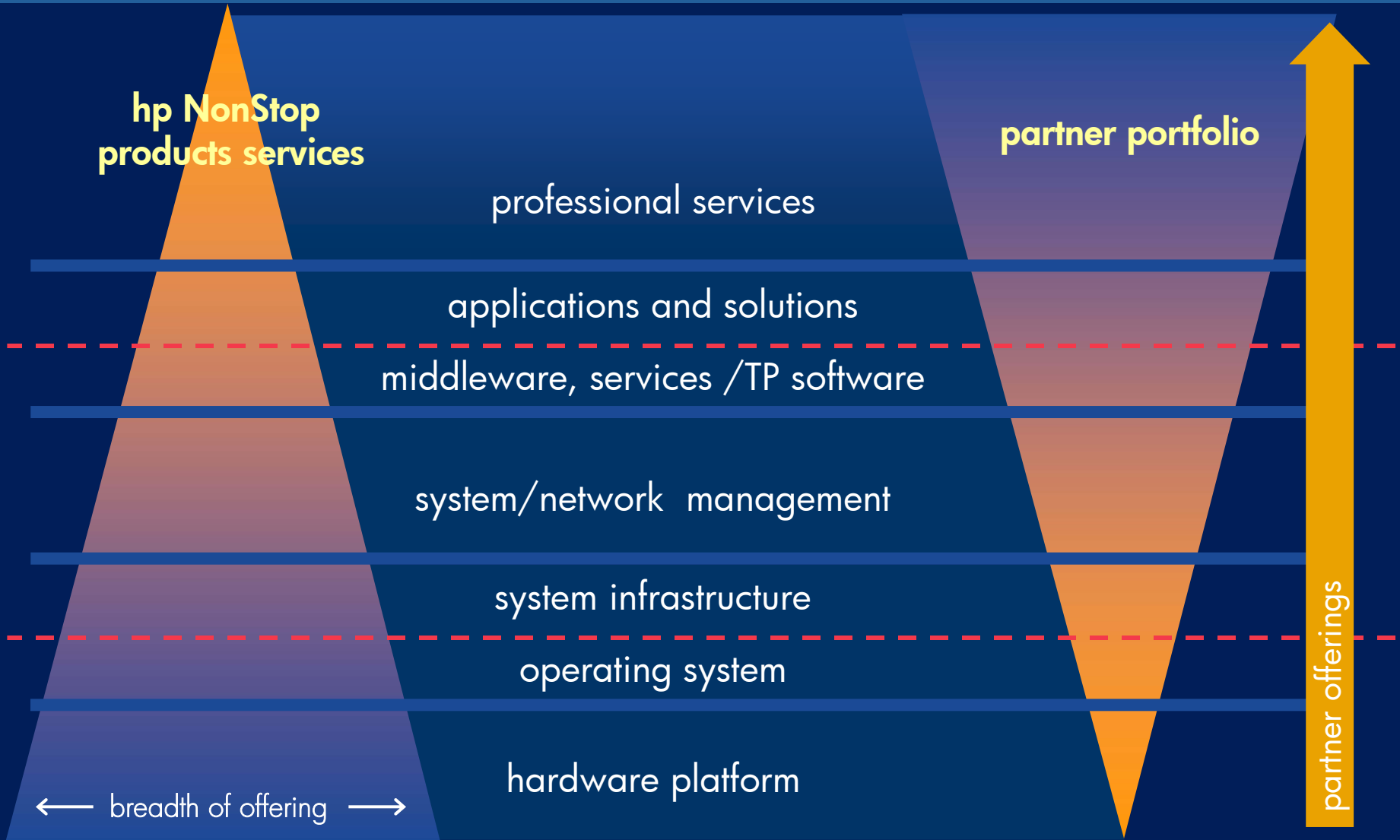
Partnering for Success



- **Ecosystem for customer value**
 - customers buy applications and solutions
 - hp provides the technology basis
 - selective innovation
 - partners provide the added-value applications, solutions and services

Our Partner Ecosystem:

A Tiered Approach to Partner Enabled Nonstop Solutions



ESS server portfolio



world's broadest, most robust enterprise offering

high-end



AlphaServer
GS Series (32 way)



AlphaServer
SC45



Superdome



NonStop^{TMTM}
S76000/S86000

mid-range



AlphaServer
GS series (8,16 way)



rp7405



rp7410



rp8400



NonStop^{TMTM}
S7600

entry-level



AlphaServer
DS series



AlphaServer
ES series



rp2405



rp2430/70



rx2600



rp5405



rp5430/70



rx5670

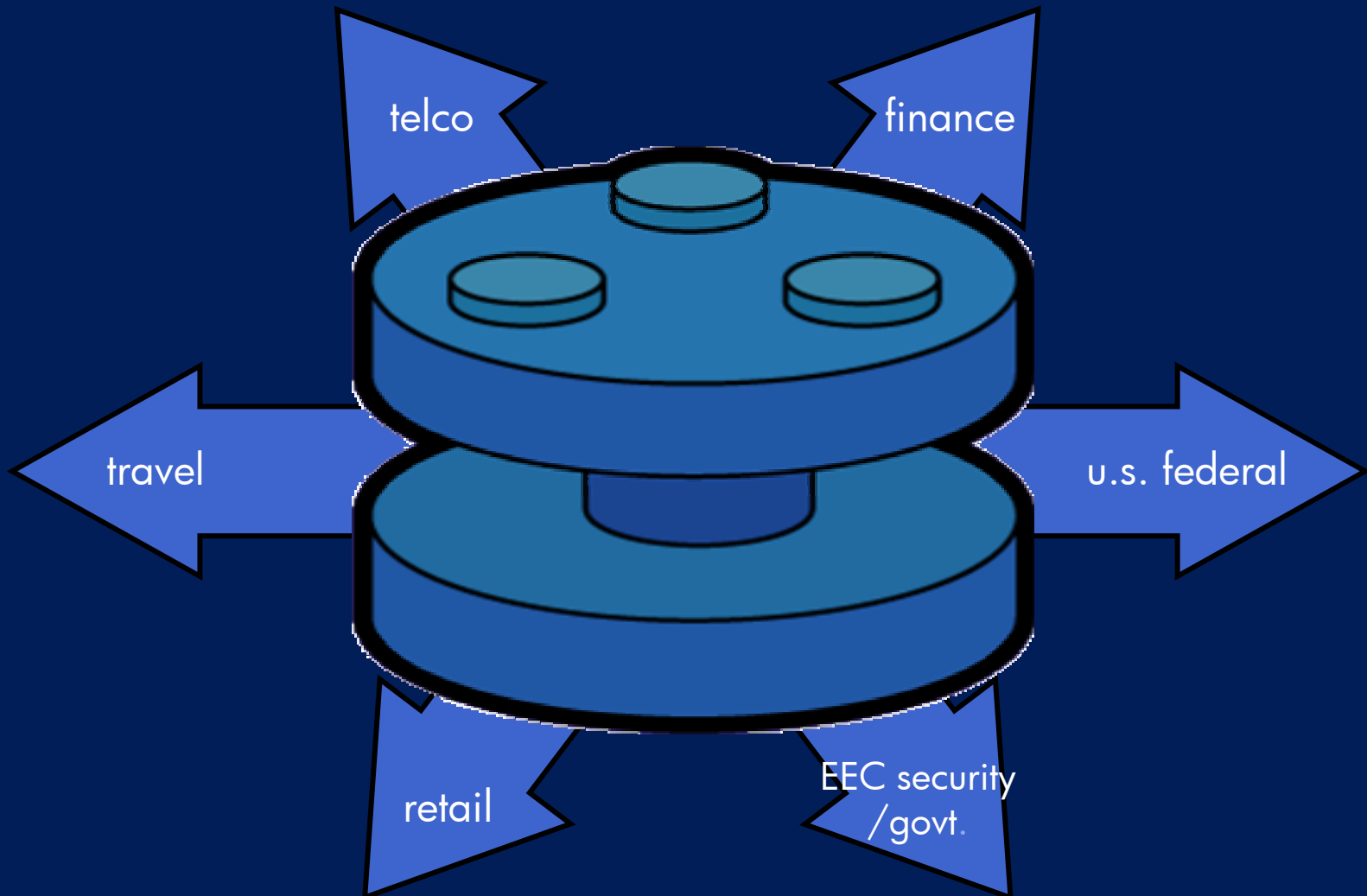
NonStop™ Enterprise Division

Our Mission

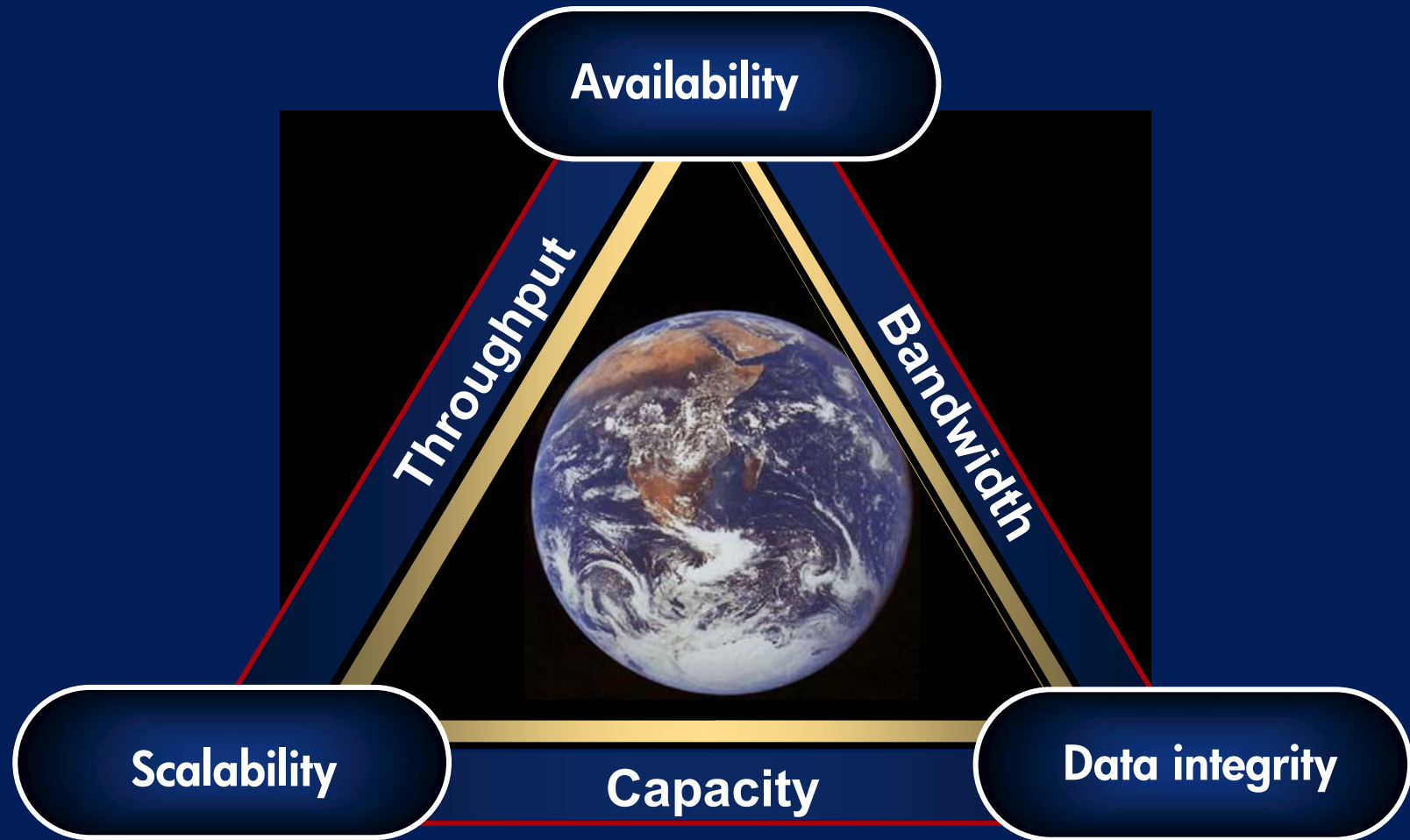


- Drive the performance, functionality, and openness of NonStop™ servers and establish the ZLE architecture in high-growth market segments as the standard for the real-time enterprise

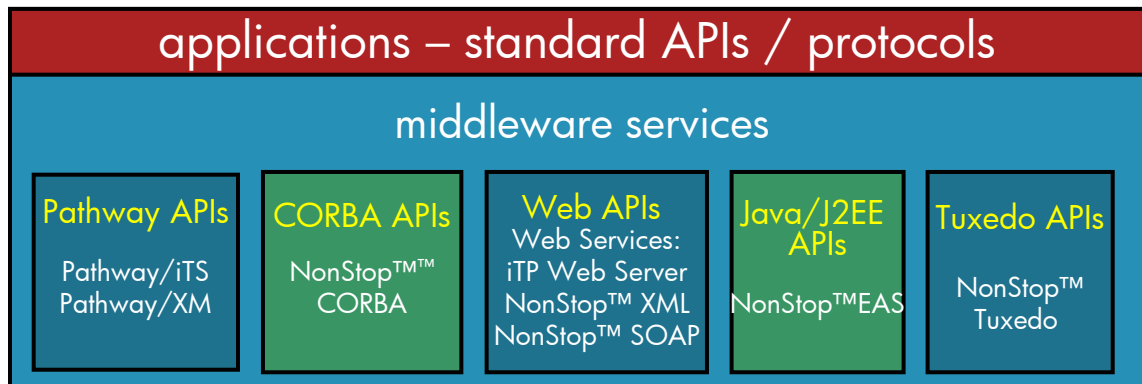
Building Momentum With Zero Latency Enterprise



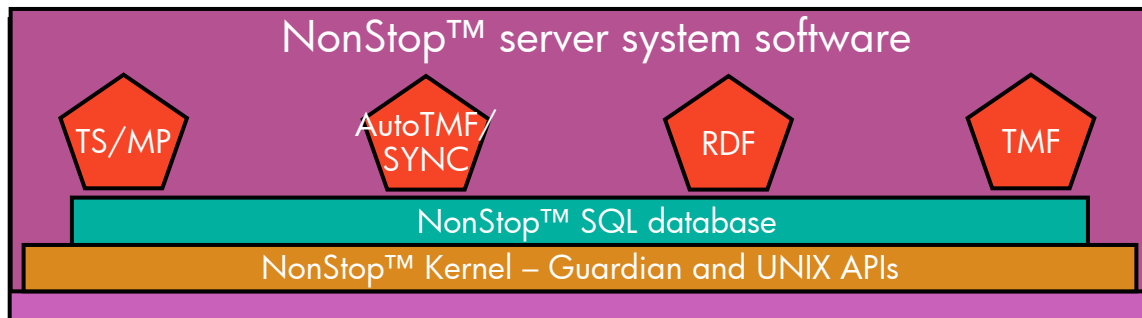
Compaq NonStop™ Systems Focusing on Fundamentals



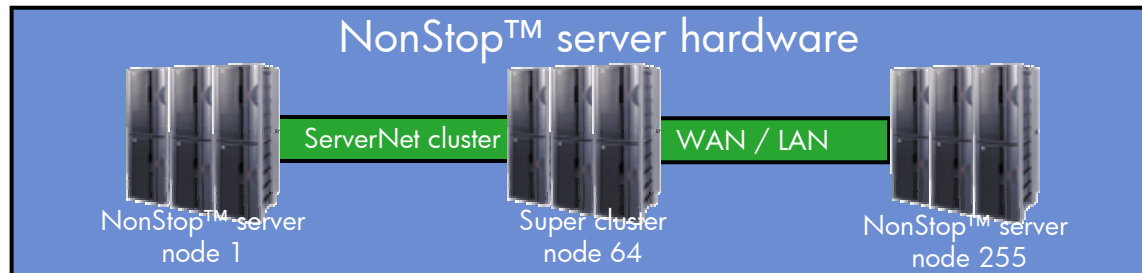
HP NonStop™ Products Delivered in 2002



- NS Java 1.3
- NS JMS
- jtoolkit R1
- NS EAS 1.1
- NS SOAP 2.1
- NS SOAP for Java
- updates for CORBA, NS Tuxedo, iTP WS, and RSC

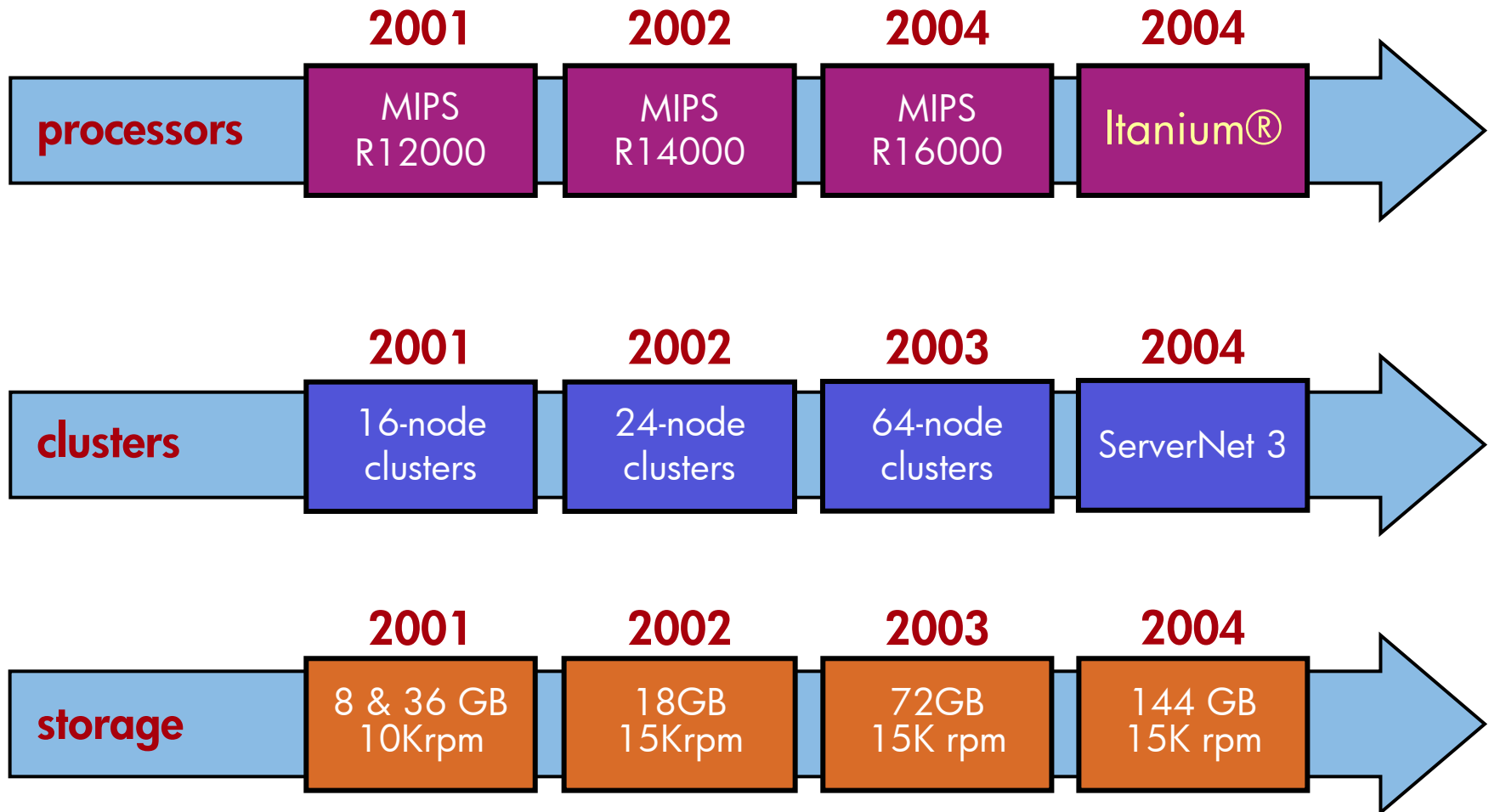


- SQL/MX R1.8 (Q4'02)
- SQL/MX R2.0 EAP (Q4'02)
- Visual Studio – ETK
- AutoSYNC
- OSS enhancements



- S86K, S76K servers
- gigabit ethernet
- 4619 disk drive
- SWAN II – CA
- 9840 FC tape drive

HP NonStop™ Server S-series Product Roadmap



- body copy

The early bird may get the worm,
but the second mouse gets the cheese.

- *Steven Wright*



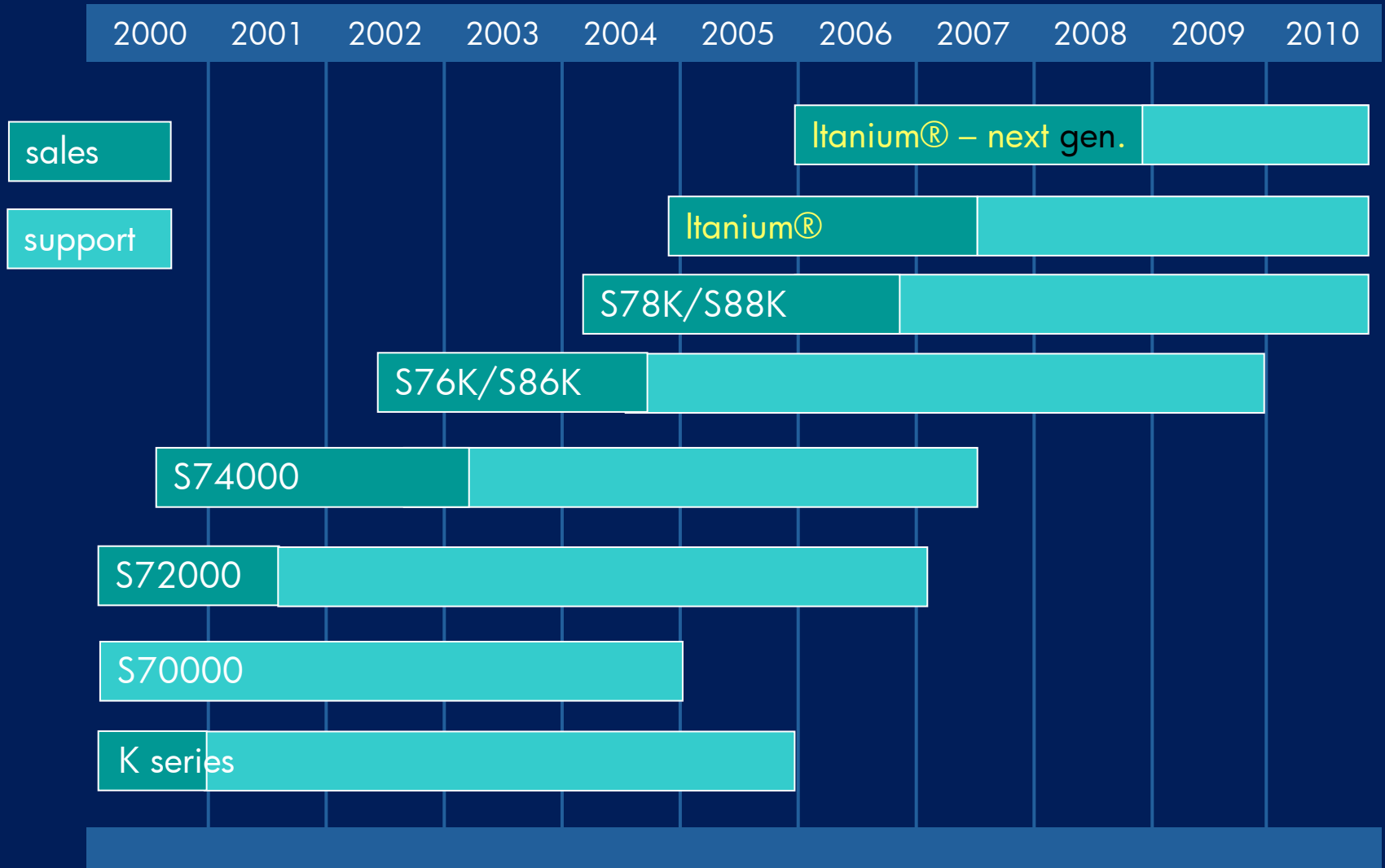
Server Strategy & Roadmaps

NonStop™ Enterprise Division's Server Strategy



- Improve performance of MIPS-based processors through end of 2004
- Transition to Itanium® processor family in late 2004
 - a more aggressive performance roadmap
- Leverage NonStop™ enterprise division's strong relationship with Intel
- Support overlap between microprocessor architectures
- Customer support timelines – at the minimum 5 years
 - MIPS-based systems supported until 2011 at the minimum
- Ease of co-existence, manageability, connectivity, etc.

NonStop™ System Servers: 10-year Roadmap



Intel® Itanium® based system



- NonStop Advanced Architecture



Itanium[®]-based Systems: R&D leverage



- Leverage existing HP Itanium-based hardware
- Developed a design with compelling strengths
- Implement that design as the initial product release, rather than wait for a follow-on system

NonStop advanced architecture requirements



Technical

- Find a better long-term approach to provide data integrity of Itanium[®]-based designs
 - eliminate need for strict, cycle-by-cycle lockstepping, which is becoming more difficult due to increased soft error recovery, advanced performance enhancement features and the advent of multicore microprocessors
- Fully leverage performance of multicore microprocessors

Business

- Raise the bar on availability and scalability
- Increase leverage from commodity/volume components
 - focus R&D resources on added value for customers
 - speed up introduction of new microprocessor technology

Benefits of the new implementation approach



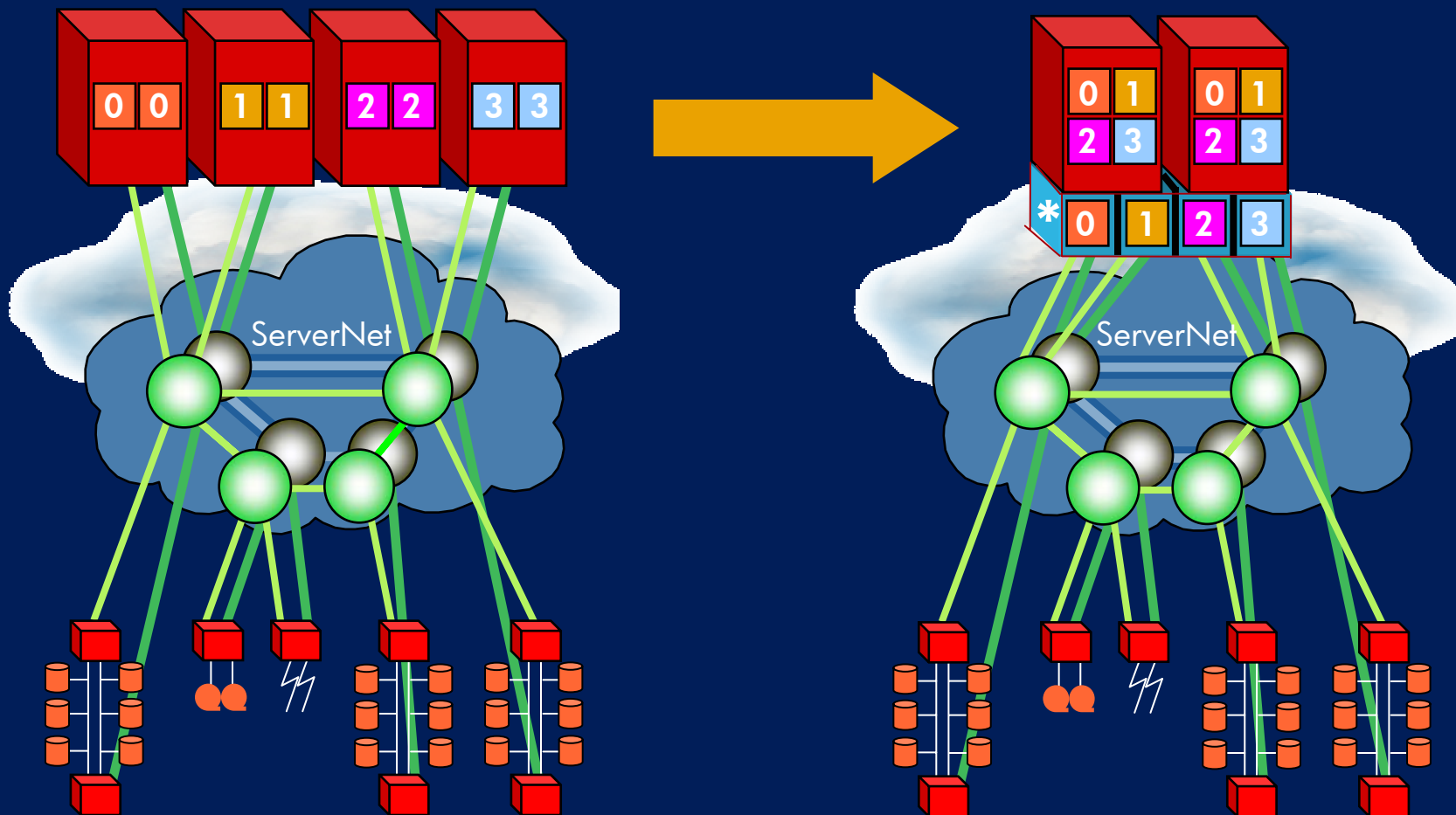
- Enhanced hardware availability
- More flexible configuration options for customers
- Faster time to market for future generations of Itanium processor
 - less need for NonStop-specific customization
- Reduced investment in hardware R&D
 - higher leverage of standard HP products

What's new, what's the same



- What's new:
 - an improved hardware implementation, offering new configuration options with respect to hardware fault tolerance
- What's the same:
 - application-level software migration from S series
 - ability to attach to S-series I/O
- What's almost the same:
 - the software development effort
 - requires only minor changes in lowest-level system software that interacts with the hardware

R&D leverage: Itanium[®]: introducing the NonStop advanced architecture

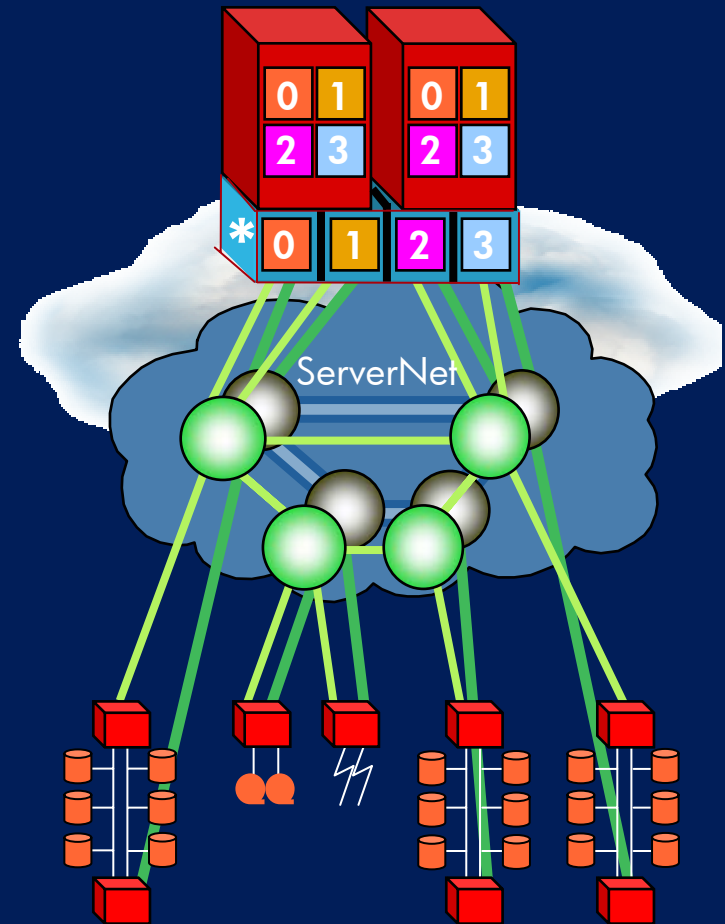


* = logical synchronization units

Integrated fault-tolerant hardware and software



- Transparent recovery from any failure
- Hardware fault-tolerance
- Software fault-tolerance
 - process pairs
 - message-based OS
 - transaction support
 - distributed single system
- Fault-tolerant parallel database
- Application server TP monitors

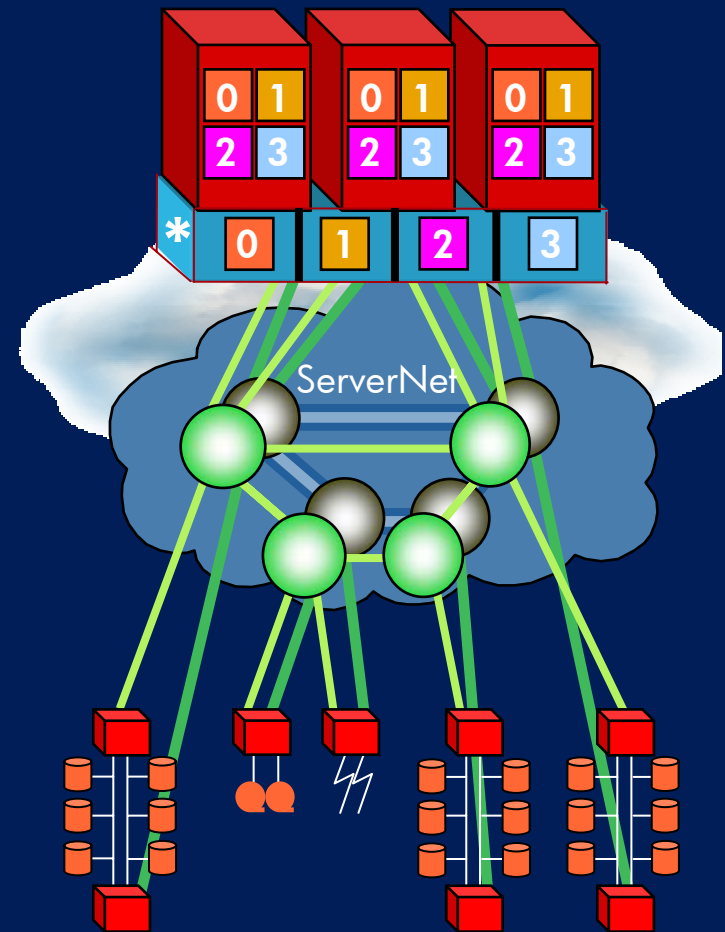


* = logical synchronization units

NonStop advanced server



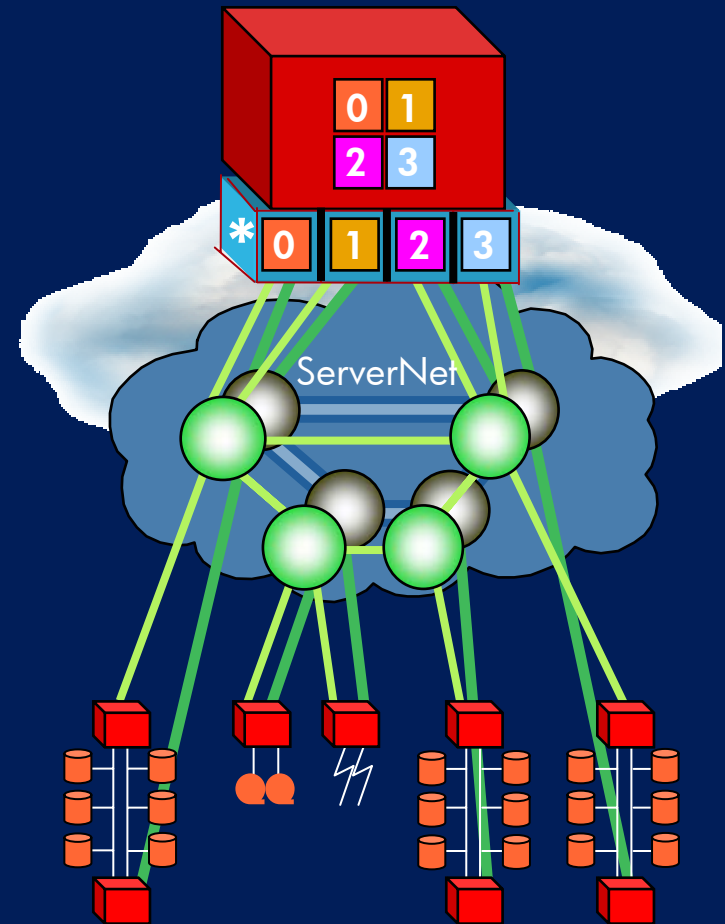
- Hardware fault-tolerance – better than S-series
 - recovery from many double faults
 - three processor slices
 - option for extra ServerNet connections
- Software fault-tolerance same as S-series



* = logical synchronization units

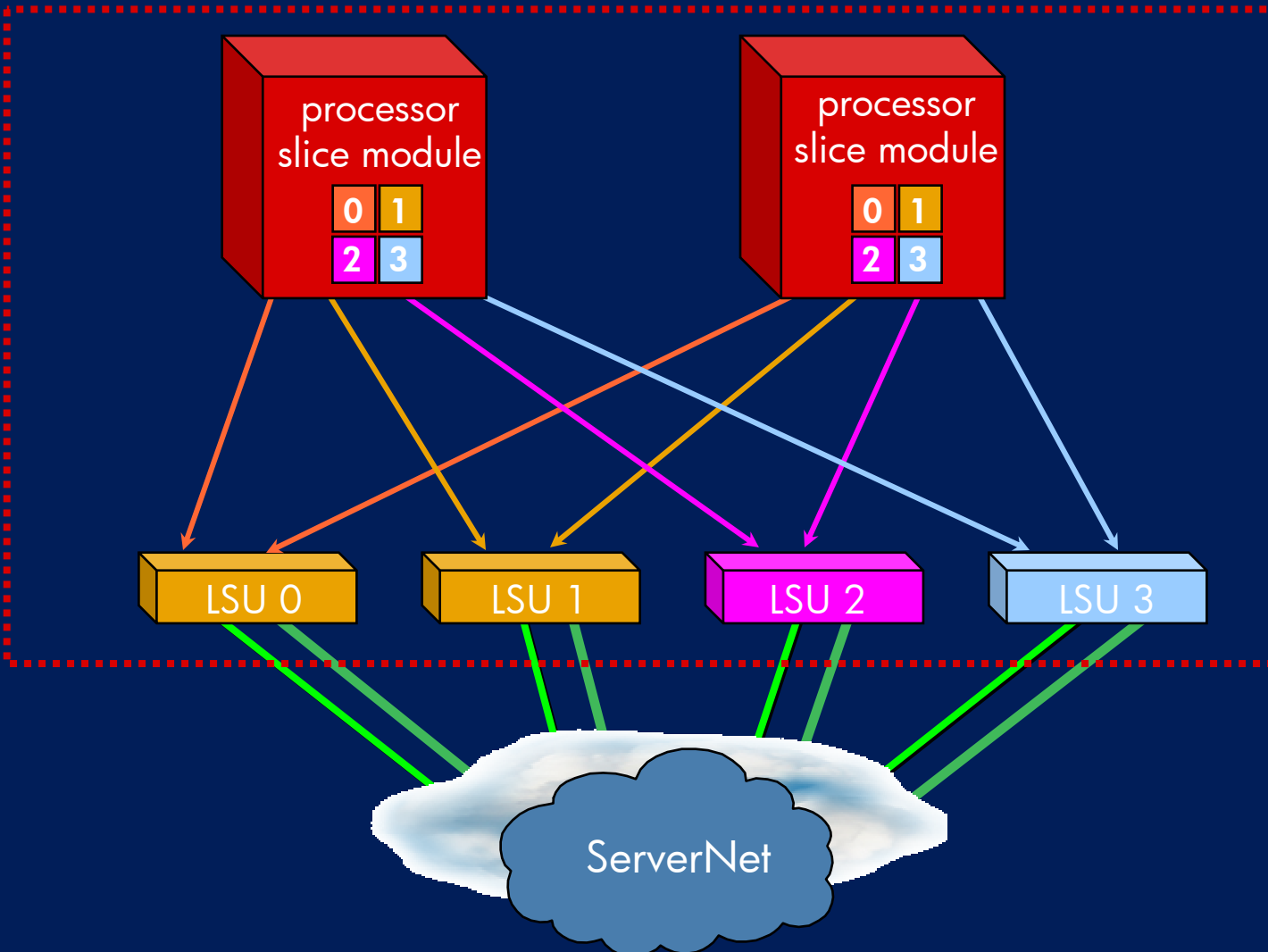
Development server

- Application compatibility with NonStop and NonStop advanced servers
- Software fault tolerance same as S-series
- Limited hardware fault tolerance

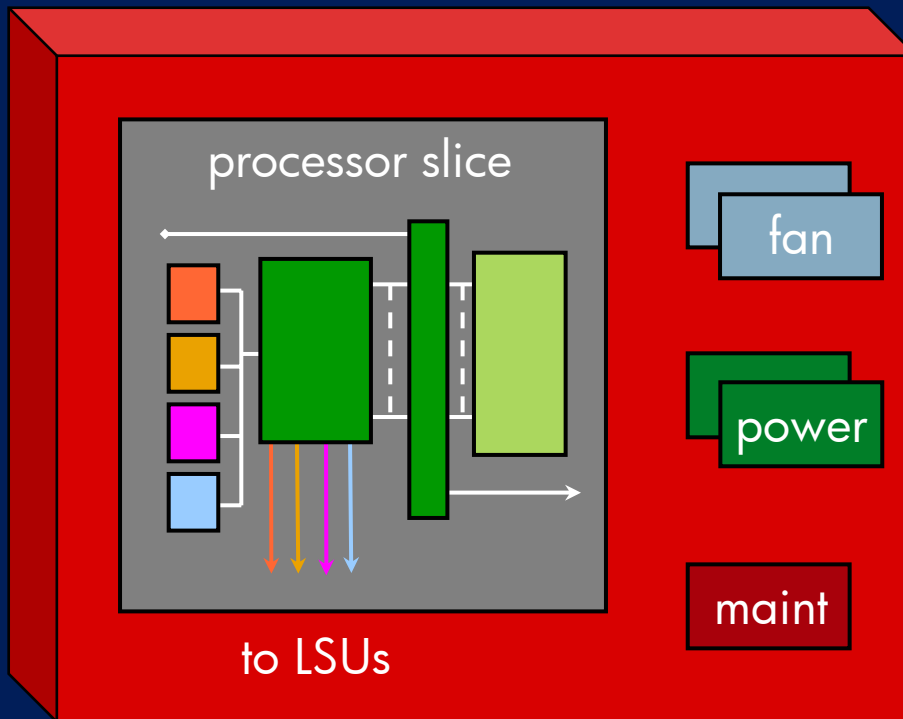
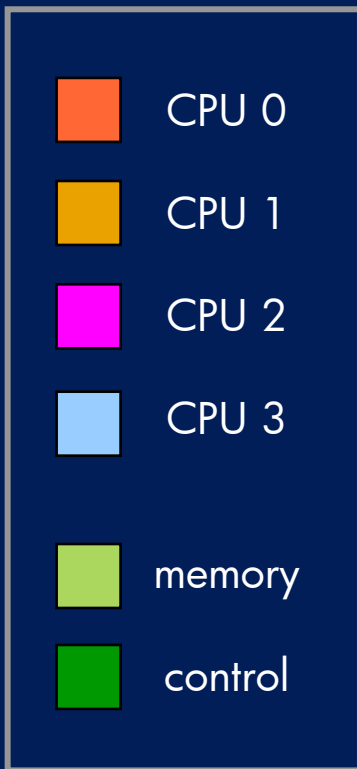


* = logical synchronization units

NonStop advanced architecture: processor block (4 processors)

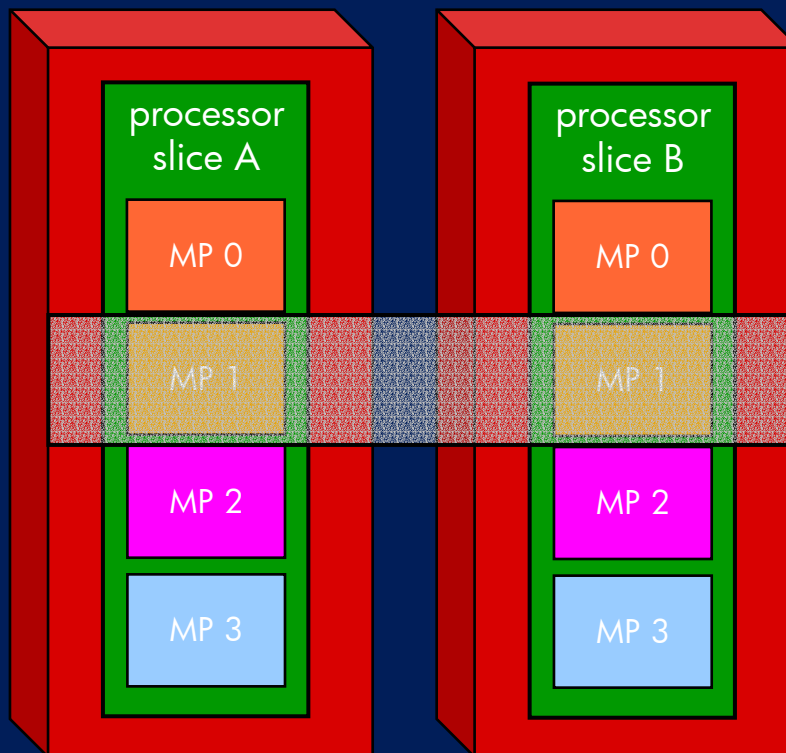


Inside a processor slice module



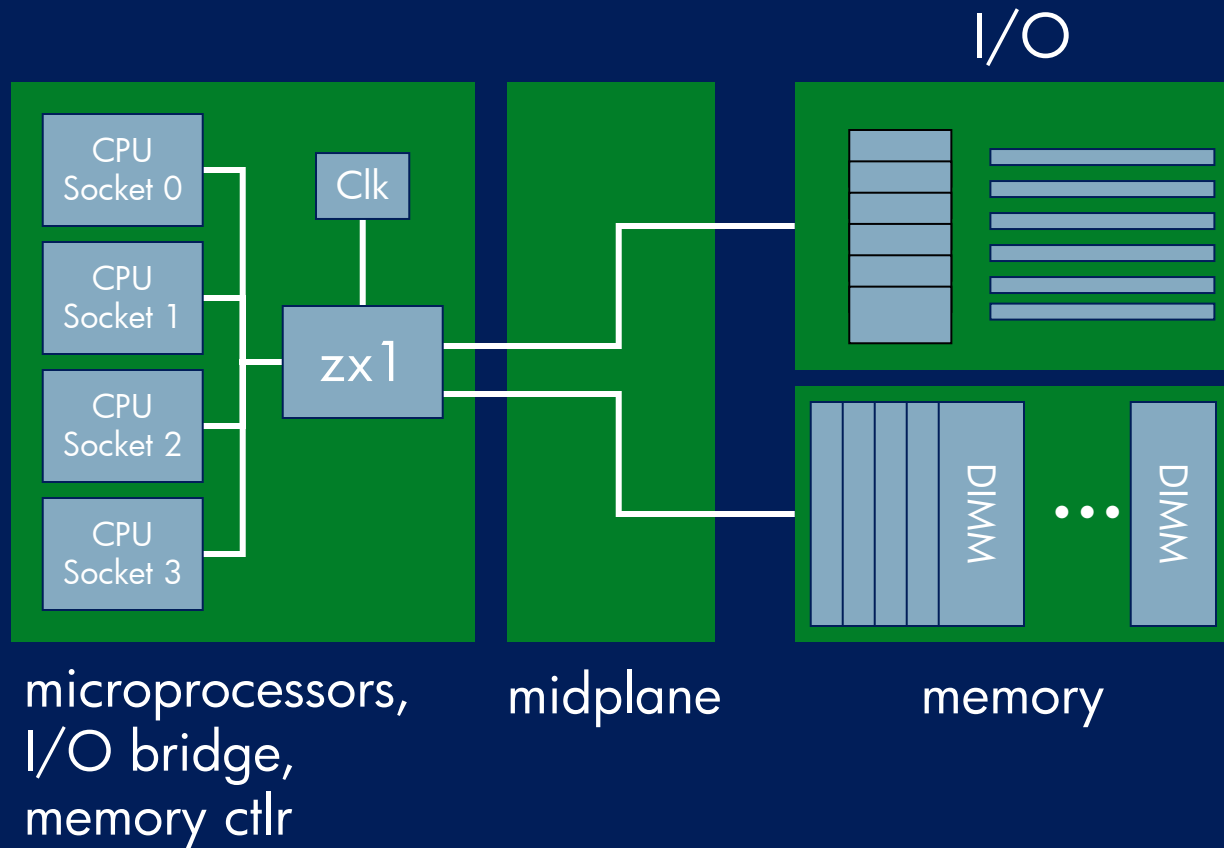
Logical processors

- Each logical processor—what the operating system sees as a single processor—is composed of one microprocessor from each of two processor slices

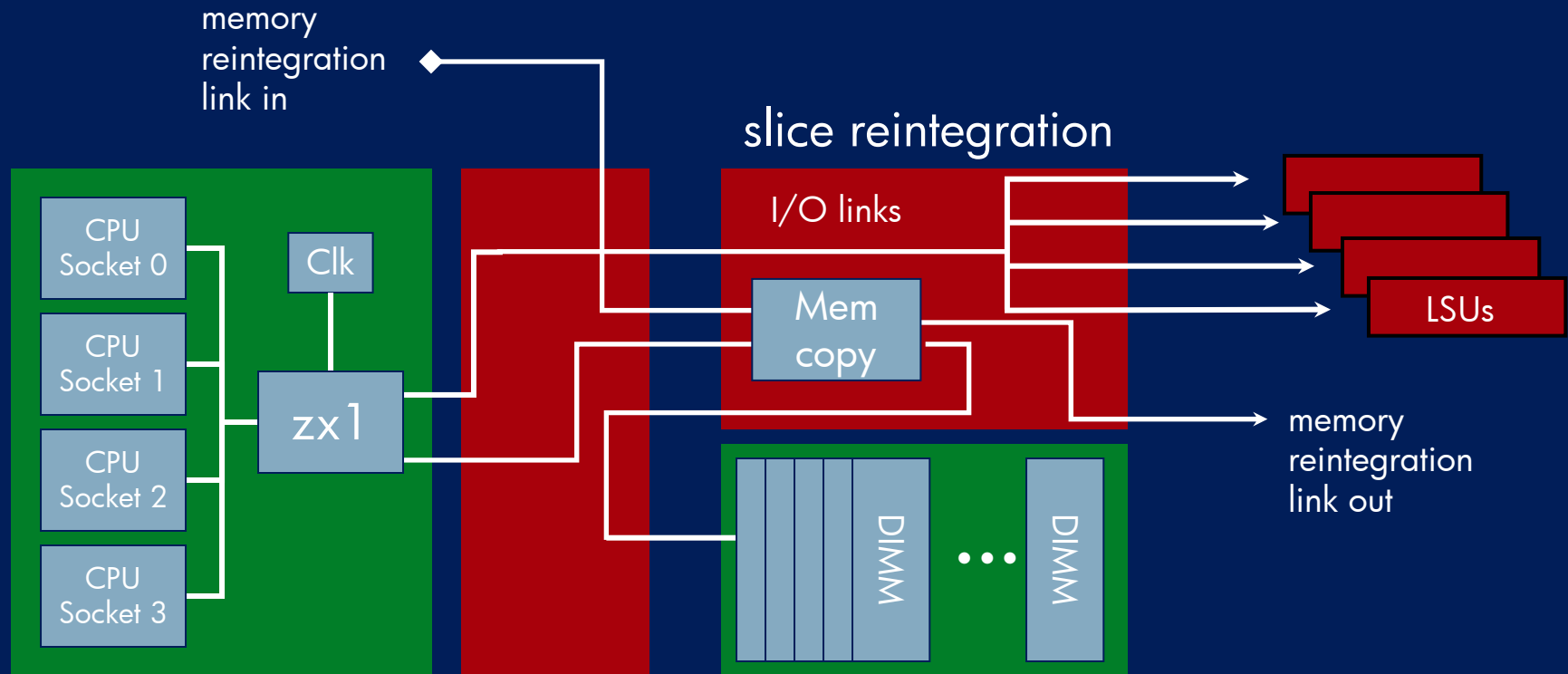


One logical processor runs the same instruction stream on two microprocessors. The results are checked by the LSU.

Inside an HP standard processor slice



Inside a NonStop Server processor slice



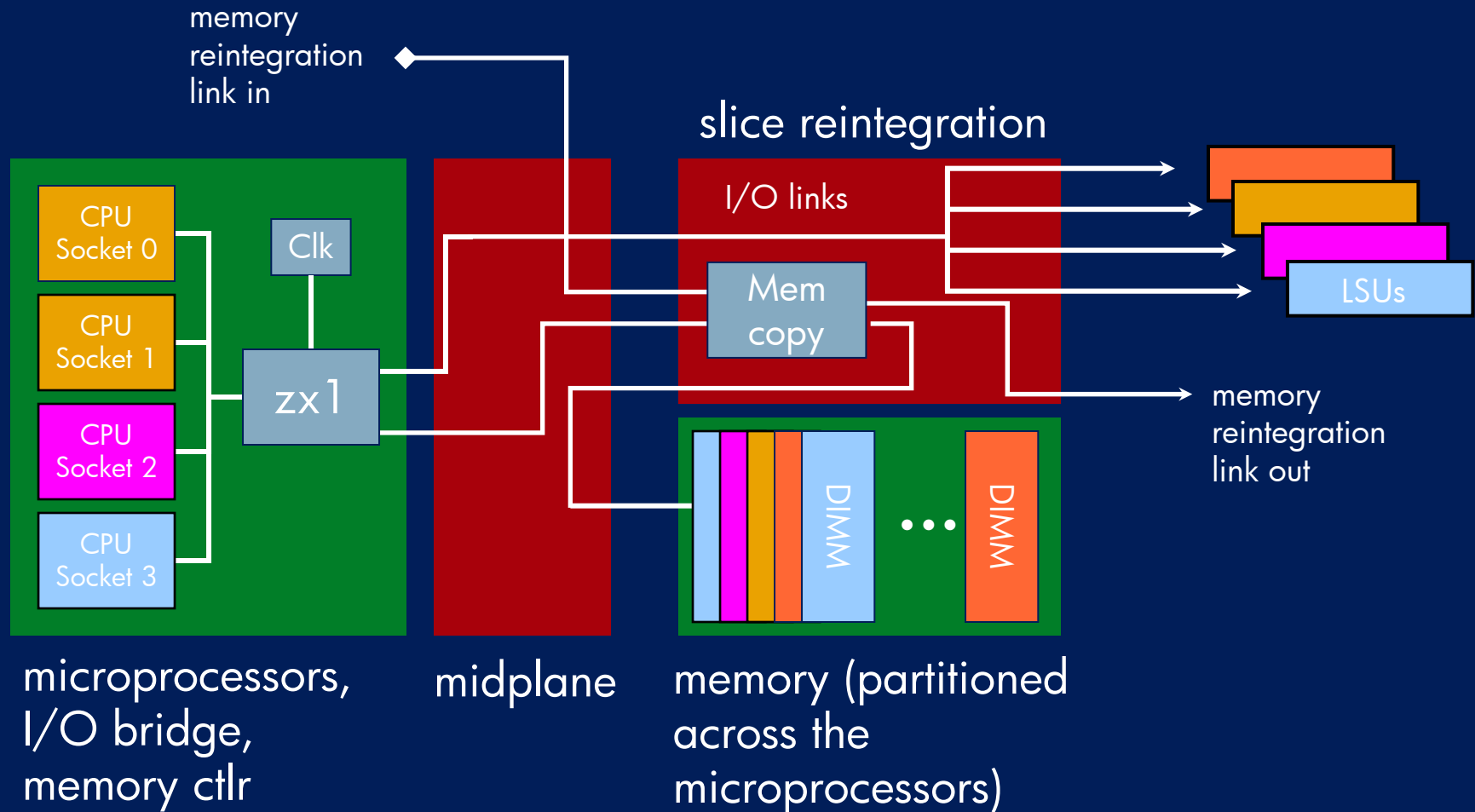
microprocessors,
I/O bridge,
memory ctrl

midplane

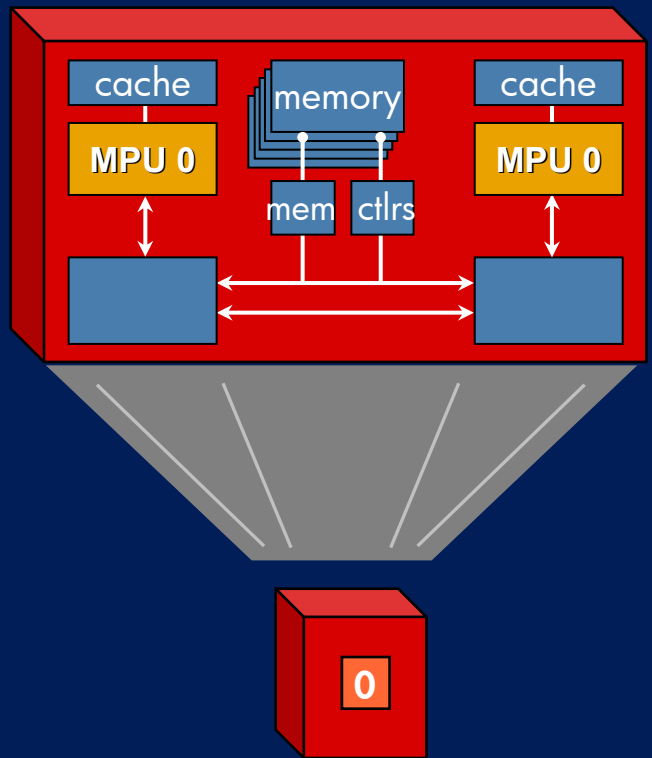
memory (partitioned
across the
microprocessors)

 NonStop value add

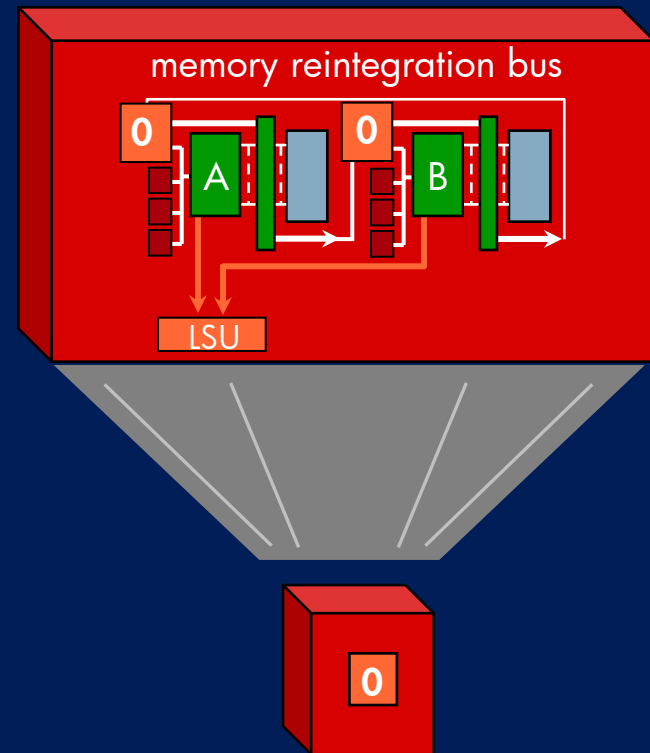
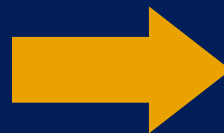
NonStop Server logical mapping



Logical processor architectural comparison



NonStop architecture



NonStop advanced architecture
(fault-tolerant configuration)

How we meet the requirements



Technical

- Will provide data integrity using logical-level synchronization
 - accommodates soft error recovery and minor non-deterministic behavior without triggering a divergence

Business

- Raises the bar on hardware availability
- Increases leverage from commodity/volume components
 - focuses R&D resources on added value for customers
 - speeds up introduction of future generations of new microprocessor technology

- For the MIPS line, we provide processor-level data integrity by tight comparison (lockstepping):
 - comparing all writes to memory by the two microprocessors
 - comparing all “I/O” (ServerNet-bound traffic, whether IPC or I/O)
 - failing fast when there is a divergence in results
- For the Itanium[®] line, we are moving to a logical comparison model:
 - comparing all “I/O”
 - performing additional synchronization as needed through “rendezvous” operations
 - performing error recovery when there is a divergence in results
 - failing only when error recovery is unsuccessful

Why change approaches?



- Tight lockstepping relies on a very constrained notion of determinism: multiple copies of a design must present the same output values in the same timeframe (clock cycle or two) when given the same input values
- “In the same timeframe” has become much harder to achieve due to the increased use of soft error recovery techniques to handle transient hardware errors
- Most hardware errors are transient and can be recovered from
 - tight lockstepping turns these into software-visible CPU failures
 - logical comparison can mask them from the software

Logical comparison design philosophy



- Logical Synchronization Units (LSUs) are the comparison and error detection mechanisms
- System software bears the responsibility for deciding how or whether to recover when an LSU detects an error
 - LSUs report back state information from all the slices to error recovery software in the affected logical processor

Hardware error recovery philosophy



- The great majority of hardware errors are transient rather than permanent
- Soft error recovery is becoming more and more extensive
- Fewer and fewer hardware faults will (or should) trigger a physical repair action

Hardware error recovery options

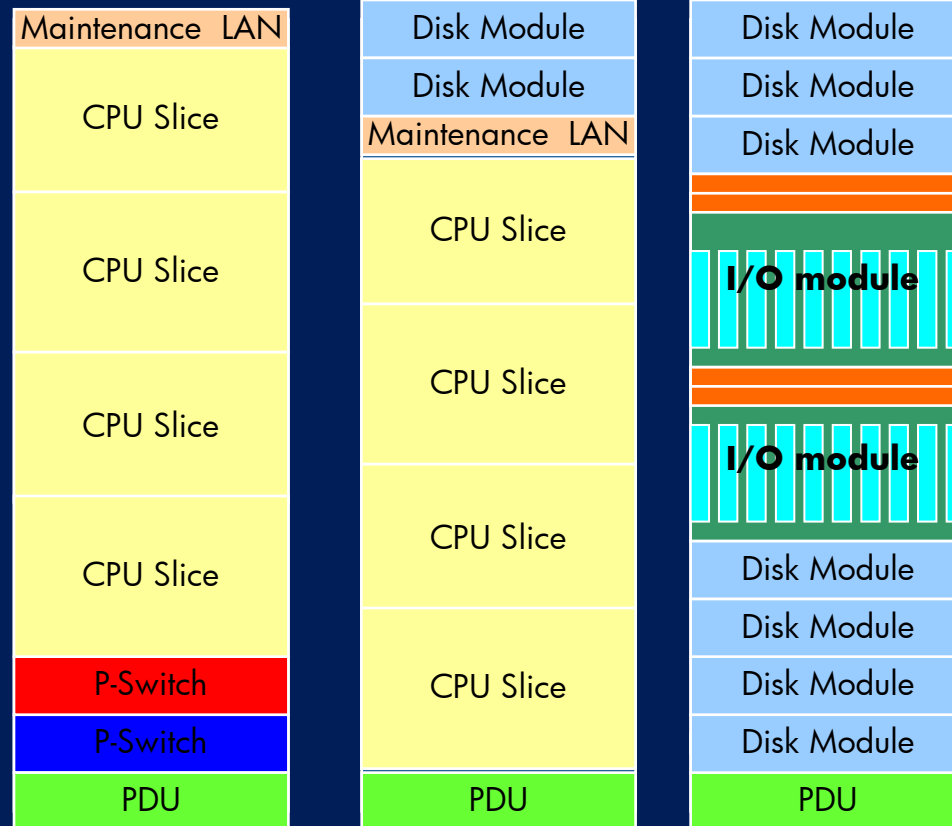


- For errors that can be isolated to a specific processor slice and are not permanent, perform memory reintegration and reenable the slice
- For errors that cannot be isolated to a specific processor slice and are not permanent (e.g. an “I/O” miscomparison), halt and reload the logical processor whose actions triggered the error
 - applies primarily to fault-tolerant (duplexed) configurations
- Keep track of hardware error occurrences; if reintegration or reloading is followed by continued failures, take the slice or logical processor out of service and schedule a repair

My mechanic told me, "I couldn't repair your brakes, so I made your horn louder."

- - *Steven Wright*

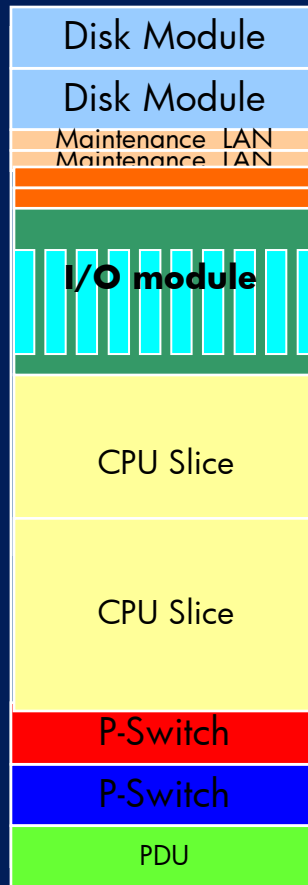
Itanium® Based Servers



Large system, Dual IO modules



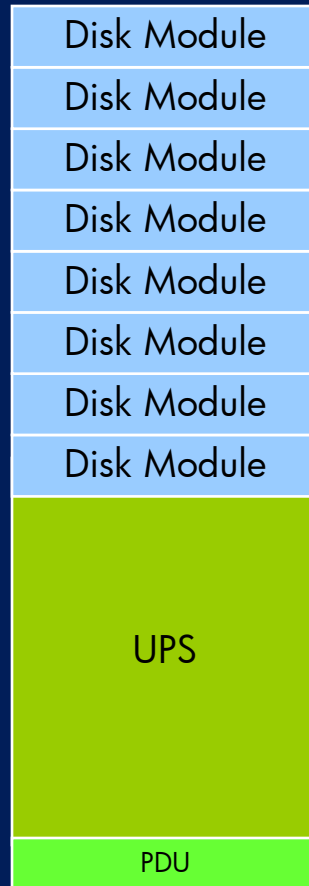
Itanium® Based Servers



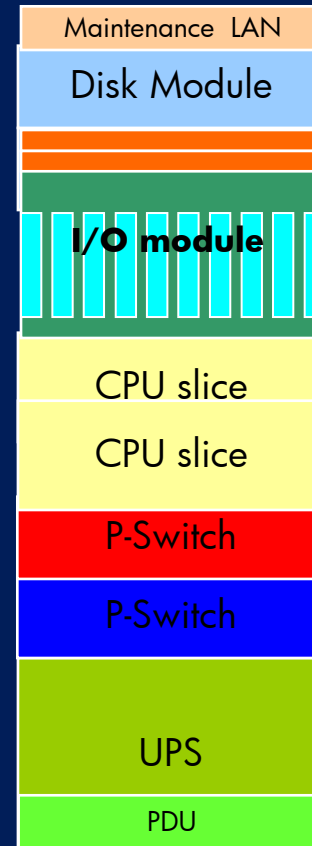
Small system



Itanium® Based Servers



Optional HP
High output UPS



Optional HP
Midsize UPS

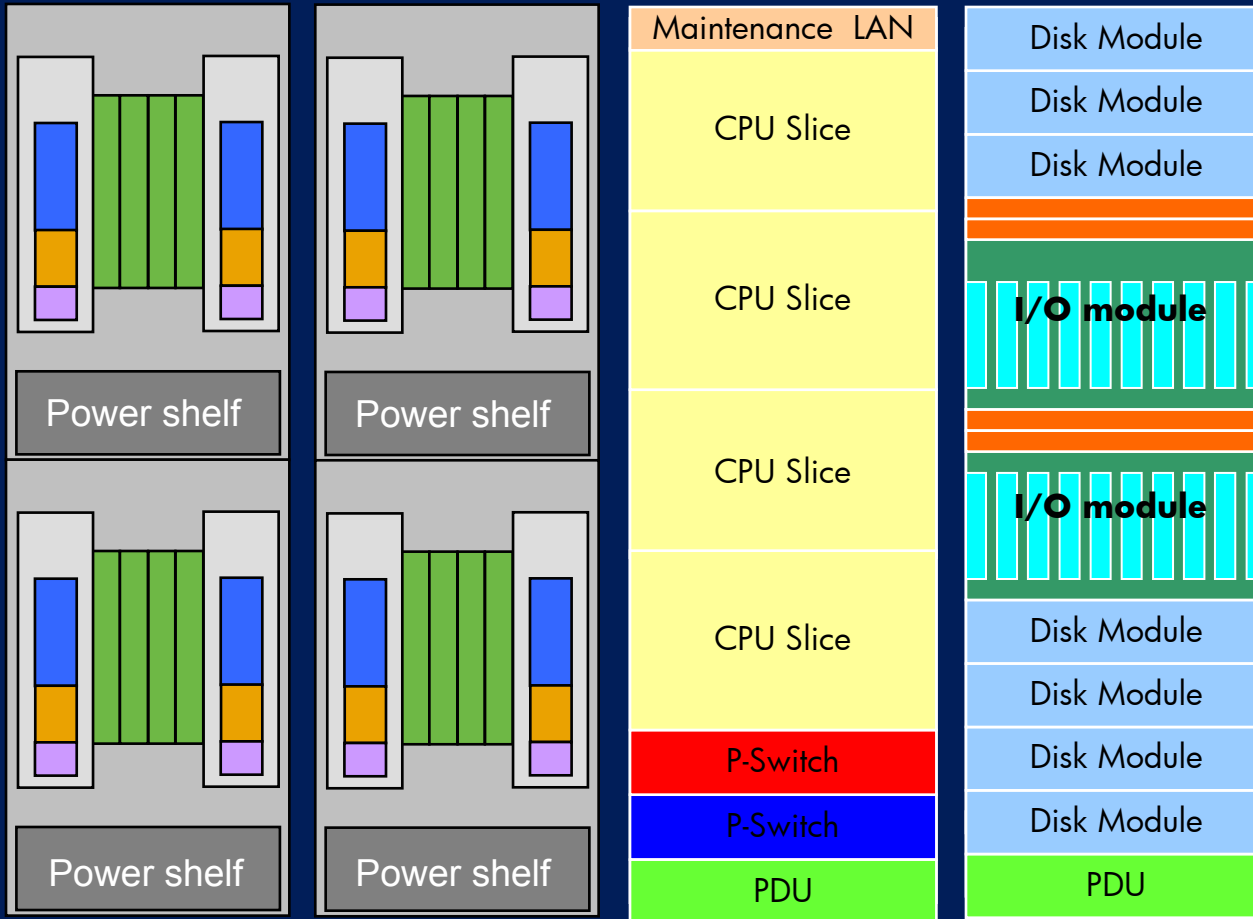
Migration to Itanium® Based Servers

Protection of Hardware investment



S-series enclosures

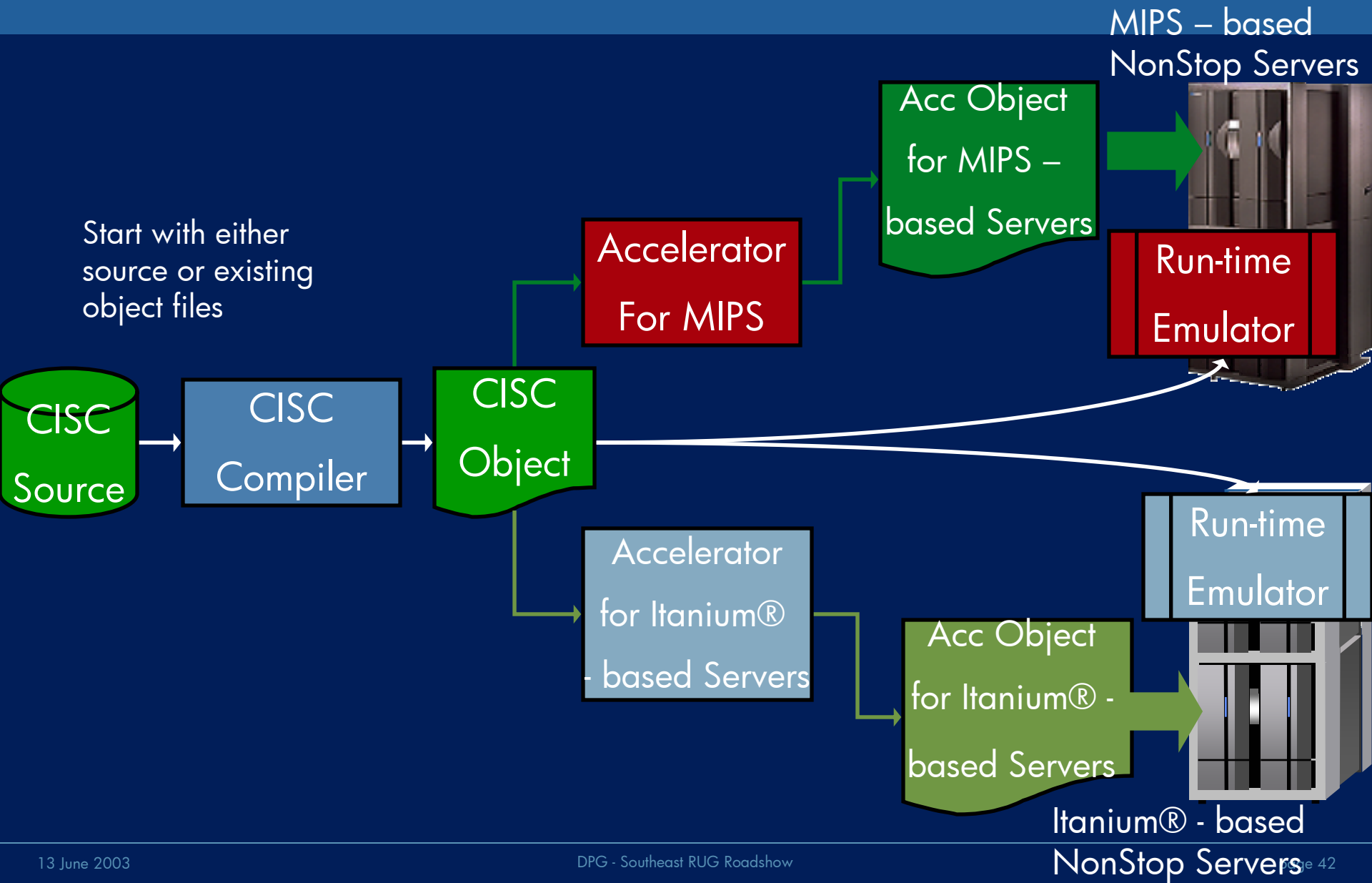
Itanium® Based



Systems can be upgraded by:

- Trade in PMF for IOMF
- Load new OS
- Connect IOMF-2 to ServerNet P switch
- Remove MSEB

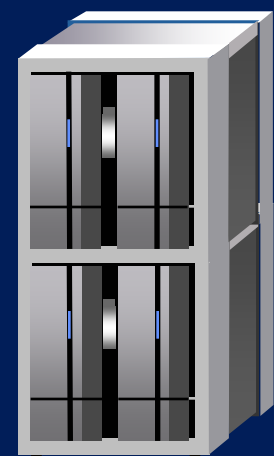
CISC Software Migration Paths



CISC Software Migration Paths – Triple-fat Objects

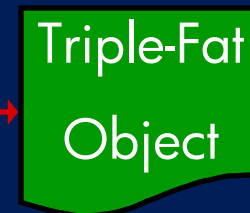
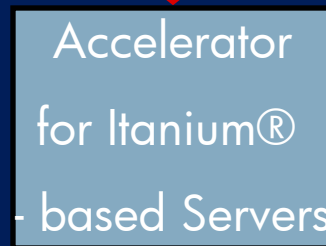
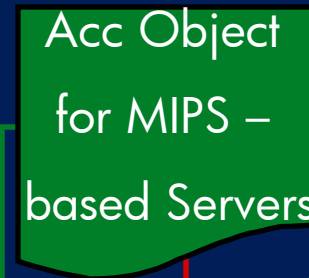
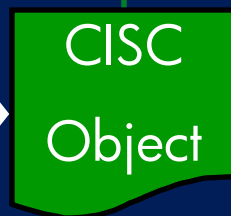


MIPS – based
NonStop Servers



Itanium® - based
NonStop Servers

Start with either
source or existing
object files

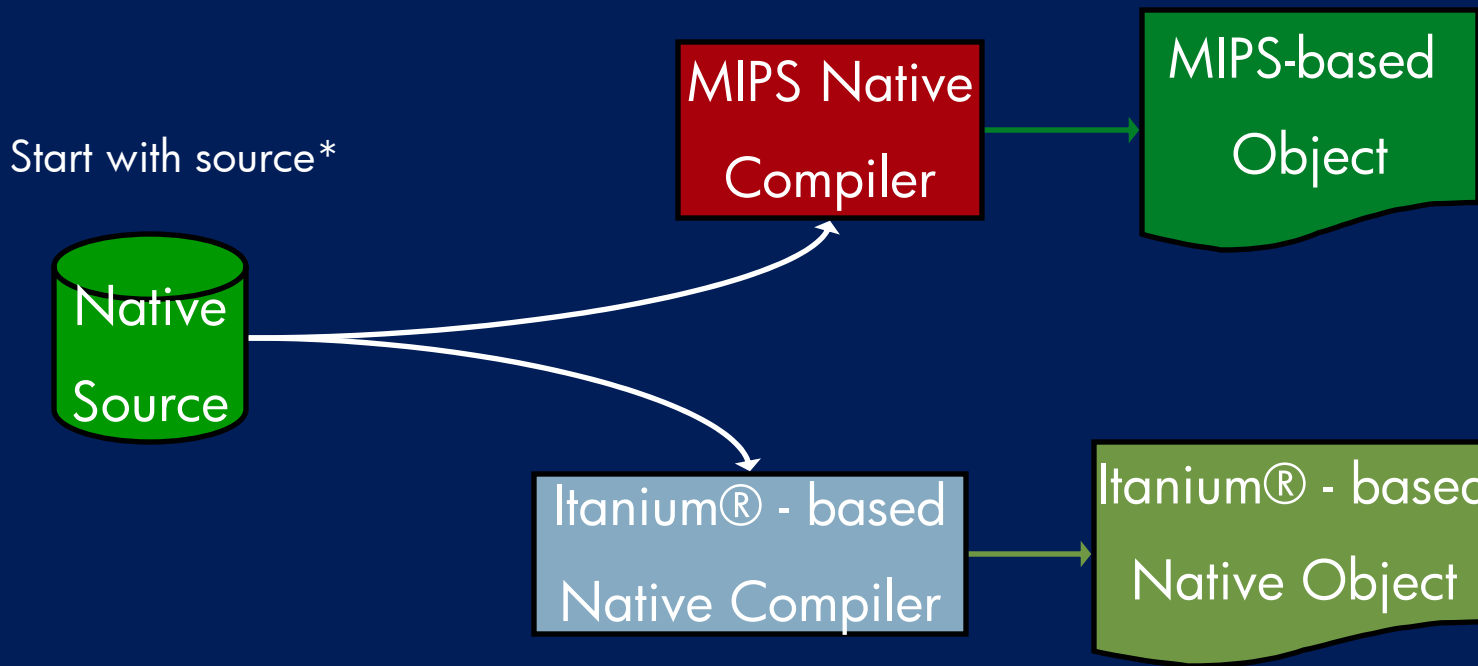


Output of MIPS accelerator
can be used as input to accelerator for
Itanium® - based Servers

Native Software Migration to Itanium® - based NonStop servers



MIPS – based
NonStop Servers




* Source changes needed for deprecated features

Itanium® - based
NonStop Servers

ETK Key Benefit Designed for Multiple NonStop Platforms

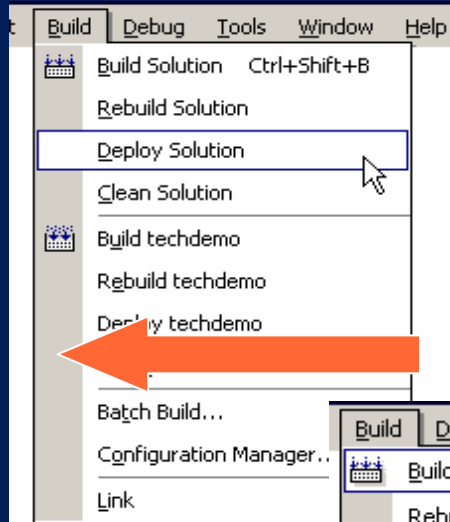


MIPS - based
Hardware
Platform



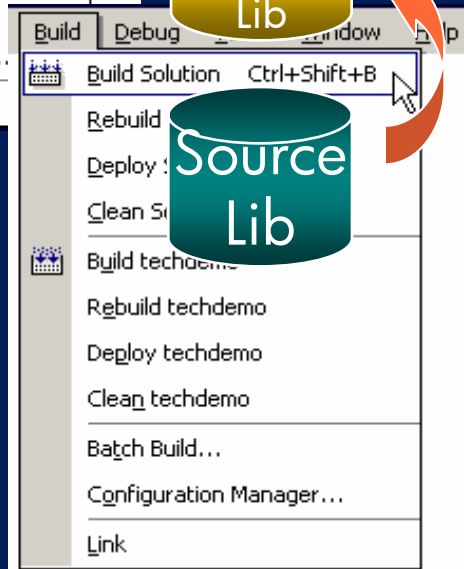
EXPAND
ServerNet
Clusters

Itanium® - based
Hardware
Platform



ETK, Windows based Tools

MIPS Native Compiler

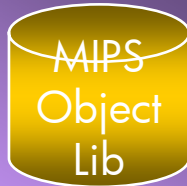


ETK Key Benefit Designed for Multiple NonStop Platforms



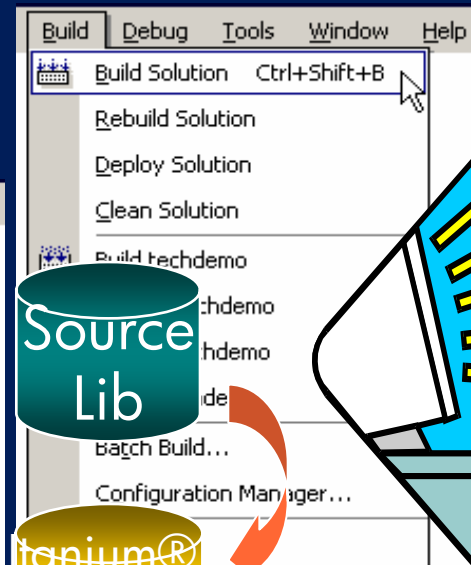
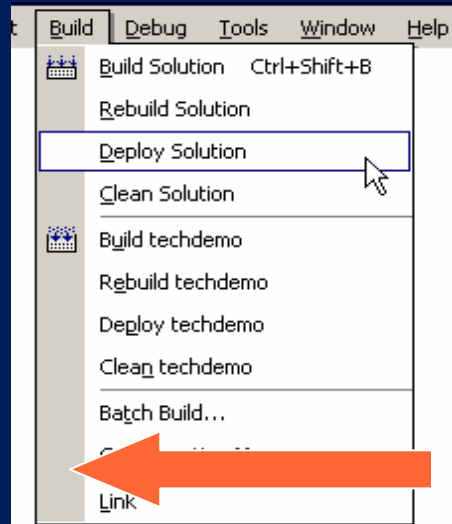
ETK, Windows based Tools

MIPS-based
Hardware
Platform



EXPAND
ServerNet
Clusters

Itanium® - based
Hardware
Platform



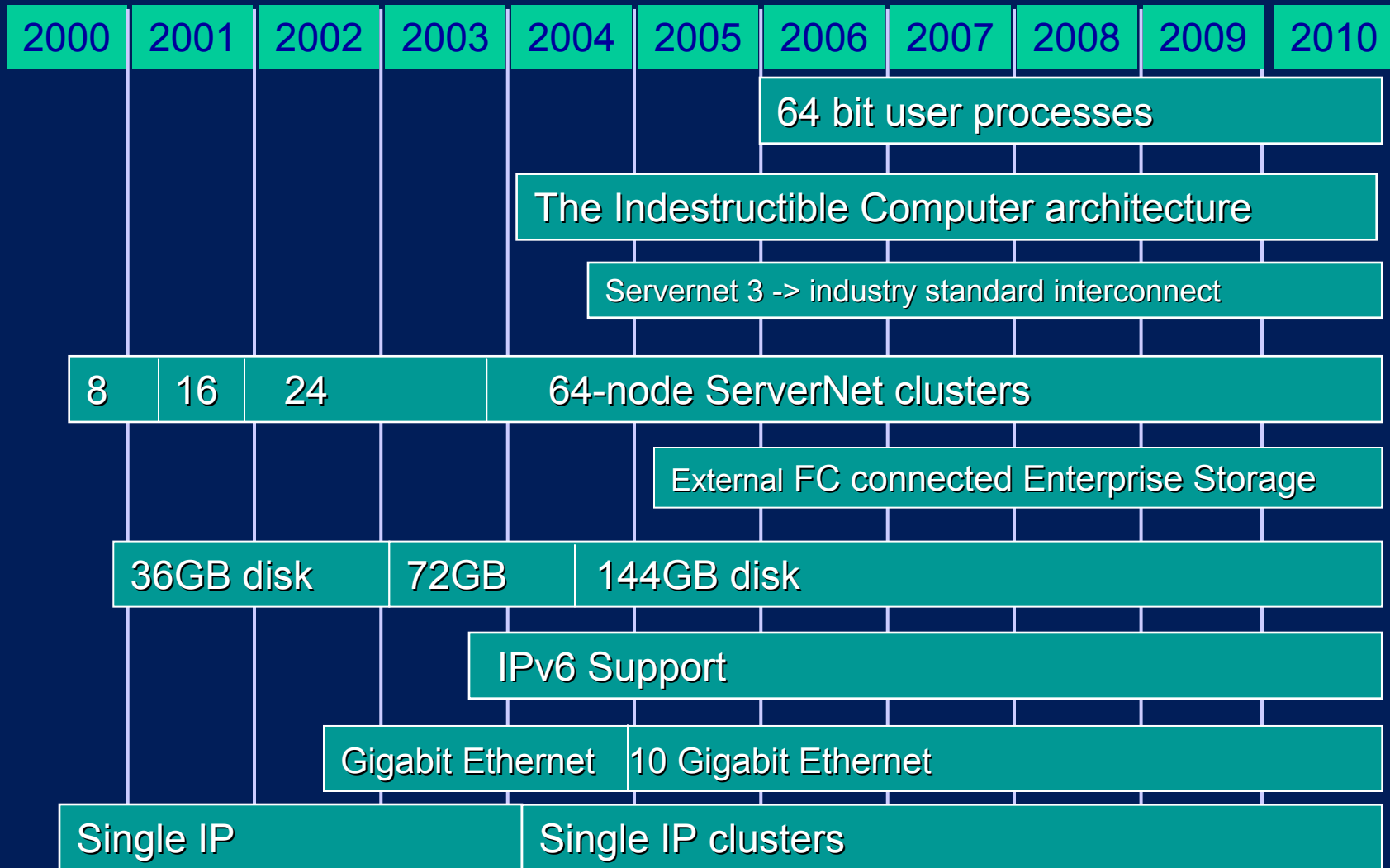
Itanium® Native Compiler

Summary



- CISC applications can be interpreted, translated, or recompiled
- CISC languages supported: C, C++, TAL, Fortran, COBOL85
- Native MIPS applications must be recompiled
- Native languages supported: C, C++, COBOL, pTAL, Java
- Environments supported:
 - CISC on all HP NonStop systems
 - Native MIPS on HP K- and S-Series NonStop servers
 - Native Itanium® environment on Itanium® - based NonStop servers
 - Application development environment for native languages on PC

HP NonStop™ Server OS and Peripherals



A photograph of two men in a server room. One man, wearing a white shirt and dark trousers, is holding a folder and looking at the other man. The second man, wearing a white shirt and dark trousers, is looking at the folder. They are standing on a mezzanine level with a glass railing. In the background, there are rows of server racks and computer monitors. The room is brightly lit with overhead lights.

Storage and NonStop™ Servers

Key Storage Trends



- Storage is emerging as a separate and increasingly strategic issue – both disk and tape.
- Backup and restore remains a major issue for most customers due to rapid increase in total disk capacity.
- Storage area networks (SAN).
- Fibre channel is currently the storage interconnect of choice. Emerging storage interconnects:
 - iSCSI: SCSI over TCP/IP gaining momentum especially for small/medium storage area networks.

NonStop™ Servers and Enterprise Storage

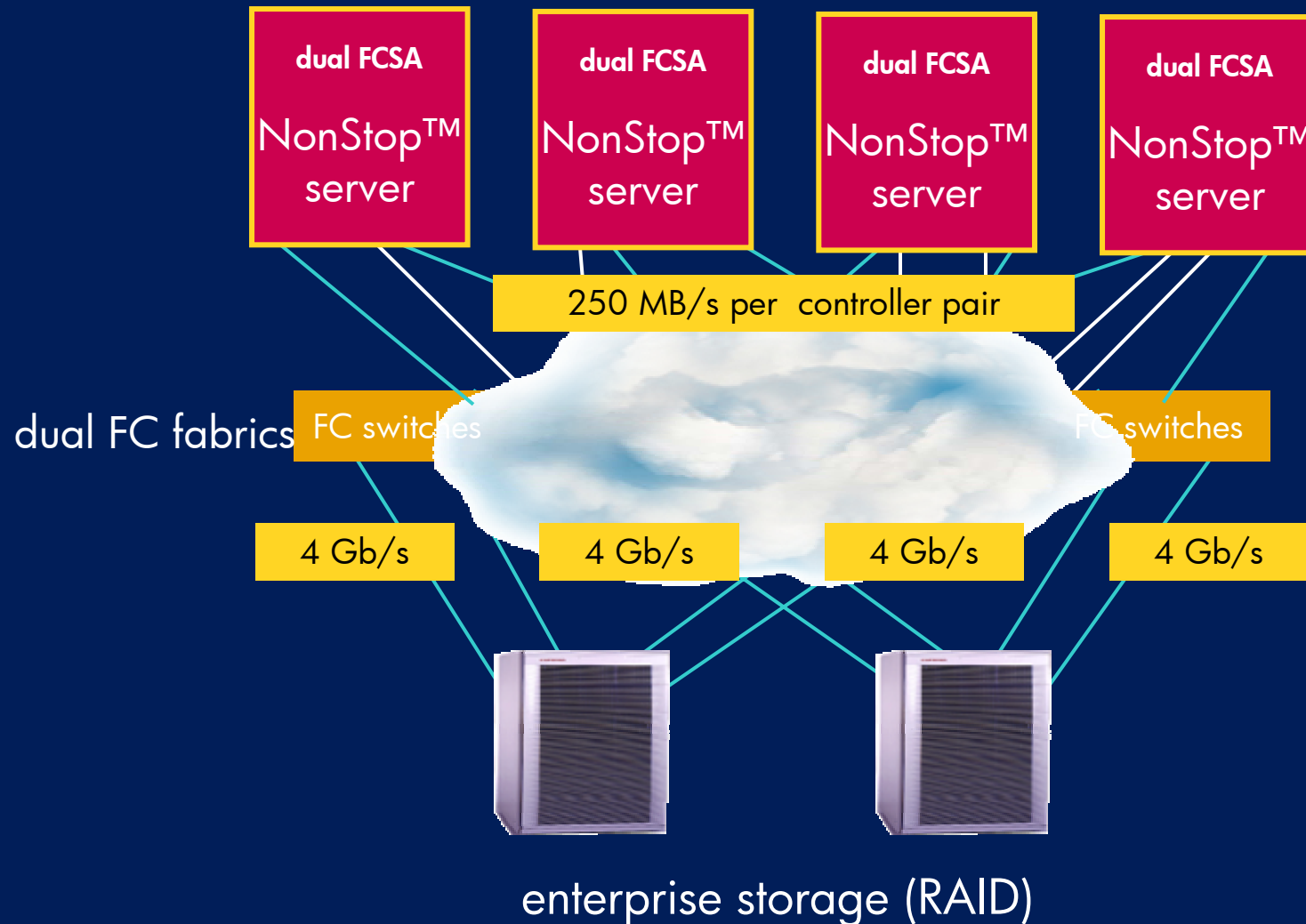


Benefits of Enterprise Storage



- **Management**
 - simplified and centralized for storage (reduced TCO)
- **Capacity**
 - pooling of unused capacity (reduce white space)
- **Flexibility**
 - dynamic capacity and reallocation
- **Reliability**
 - redundant cache and RAID (redundant array of independent disks)
- **Replication**
 - faster backup and snapshot copy
- **Performance**
 - large cache distribute hot spots (load balancing)

NonStop™ Server Enterprise Storage (probable) Attachment



Tape Products

- body copy



Tape Products



Three-tier tape device offering

- Low end
 - DAT
 - Table top DLT 7000
- Mid range
 - Super DLT
- High end performance
 - STK “eagle” 9840 SCSI & fibre channel

Library and long distance connectivity

- CTL700/M tape library for mid-range and high end tape
- STK 9310 + 9840 Powderhorn support
- Extenders SCSI & Fibre channel

Future Tape Products



Tape drive

- Support for HP ULTRIUM LTO tape technology Q3/Q4 2003
 - LTO is rapidly being established as an industry standard alternative to single source DLT

Library

- STK will stop selling L700 libraries with SDLT220 in mid year
- CTL700 with LTO tape drive will become available late 2003

Tape Products in General

- NonStop™ server division is working to eventually support the complete rang of HP tape products

19 Things That It Took Me 50 Years To Learn

by : Dave Barry



- 3. There is a fine line between “hobby” and “mental illness”.

A photograph of three business professionals in an office setting. On the left, a man in a white shirt and red tie is gesturing with his hands while speaking. In the center, a woman in a black blazer is listening intently. On the right, another man in a white shirt and red tie is also listening. They are standing in front of a window with a grid pattern. A blue rounded rectangle is overlaid on the bottom right of the image, containing the text 'Software Roadmap and Strategy' in white.

Software Roadmap and Strategy

HP

- Choice of technologies and solutions
- Choice of platforms
- Choice of professional consulting services

NED

- Align with HP middleware and OM strategy
- Provide best of breed 3rd party middleware products
- Leverage NonStop™ characteristics
- Protect and extend customer's NonStop™ software assets

NonStop™ Server System Management Strategy



Basic strategy - deliver customer happiness through wide range of choice.

NonStop™™ server system point products

- Performance Management Bundle (new version 4)
- Availability monitoring with ASAP (new entities)
- Web-based management with Web ViewPoint (new version 4)

NonStop™ server and enterprise management with HP OpenView

- OpenView Network Node Manager (NNM)
- OpenView Operations (OVO)

Partnering for customer choice

- Partner OpenView agent products
- Enterprise system management through multiple enterprise management frameworks -
 - TIVOLI, CA Unicenter TNG, BMC

NonStop™ SQL



Continuing improvements

in one of our “crown jewels”

The Core Value of NonStop™ SQL



- Massive linear scalability (proven from sub 1 TB to over 110TB).
- Innovative, high-performance SQL parallel access into database.
- Mixed concurrent OLTP and large queries on SAME platform.
- Simple, lower cost, online enterprise database manageability.
- Drastically reduces or eliminates data replication. Absolute data integrity.
- Lowest total cost of ownership

NonStop™ SQL/MX Extends These Values



- Open access into NonStop™ SQL through ANSI SQL-92 standards.
- Lower development costs by using standards-trained staffs.
- Increased developer productivity through enterprise toolkit, C++, & java.
- Lower ongoing costs by leveraging commodity access tools.
- Easier web-enabling of SQL apps through java features in SQL/MX.
- Faster, simpler porting of applications to NonStop™ SQL platform.
- Innovative features like publish/subscribe and data mining functions to quickly derive more value from SQL databases

NonStop™ SQL/MX R2.0



- ANSI 92 tables
- grant/revoke security
- triggers
- referential integrity
- online manageability (like SQL/MP)
- IEEE floating point
- Unicode (UCS-2)
- enhanced module management
- range and hash partitioning
- Utilities equivalent to MP
- Management GUI (web based)
- ETL (Import, Dataloader)
- Backup/Restore (includes GUI)
- performance

NonStop™ server communications

- **IPV6** - expanded addressing
 - introduces security standards
 - introduces mobile tracking
 - native support for Expand
- **New SWAN is shipping**
- **Gigabit ethernet is shipping**
 - 500 mbits/sec
- **New 4 port communications board in the works**
 - 2 ports full speed gigabit ethernet
 - 2 ports fast ethernet
 - FCS late 2004 est.
 - Replaces E4SA 4 port enet, single port GESA gigabit board, and single port FESA fast ethernet board.

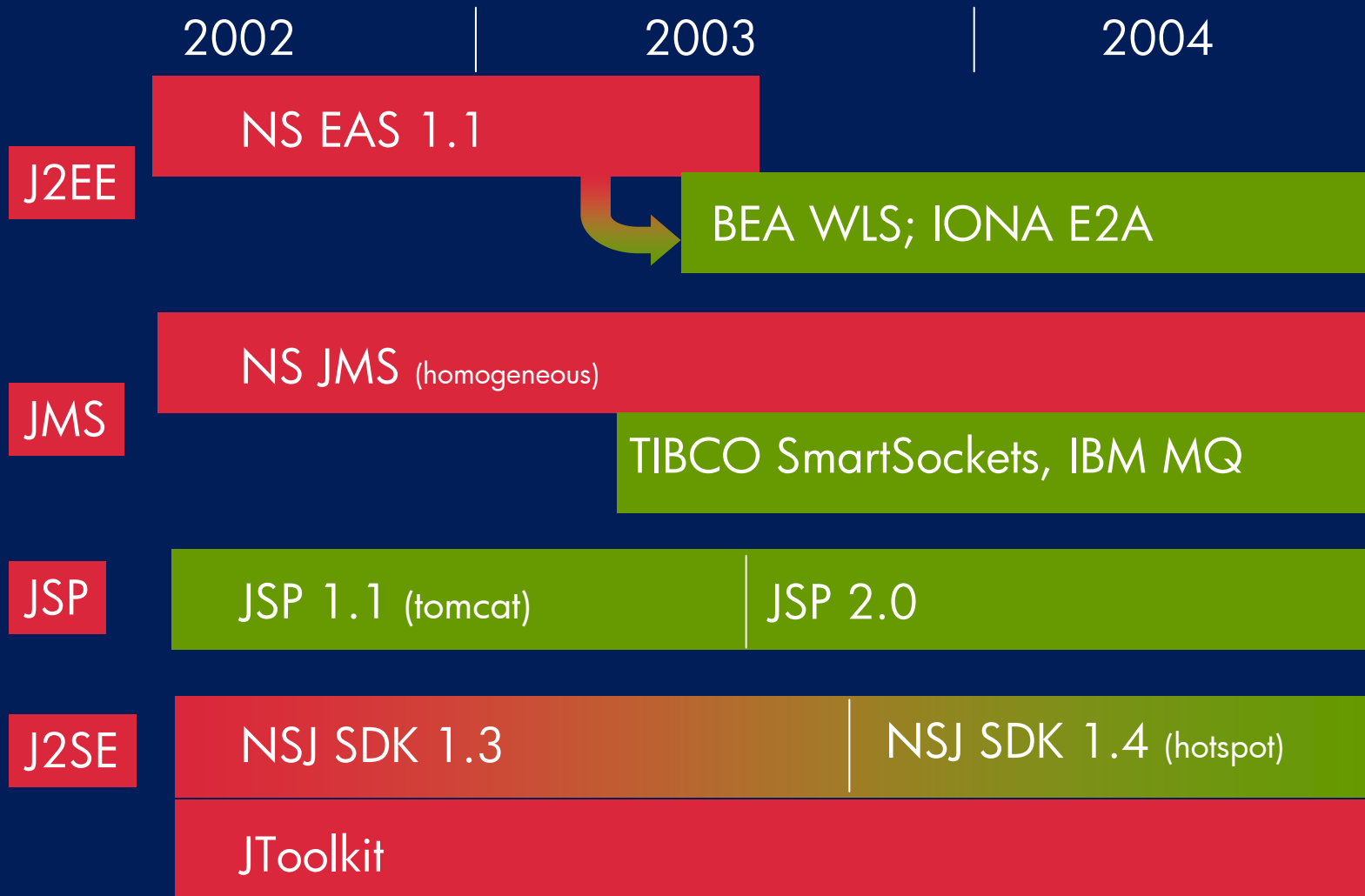
Dave Barry on Beer



"Without question, the greatest invention in the history of mankind is beer.

Oh, I grant you that the wheel was also a fine invention, but the wheel does not go nearly as well with pizza."

Java Roadmap



Enterprise Toolkit—NonStop™ Edition



- a Visual Studio .NET based application development environment for NonStop™ servers
 - fully integrated into Visual Studio .NET
 - same look and feel as that of Visual Studio .NET
- leverages Microsoft technologies and usability research
- ability to leverage more PC tools
 - dozens of vendors are participating in the integration program and ship their products as Visual Studio .NET extensions

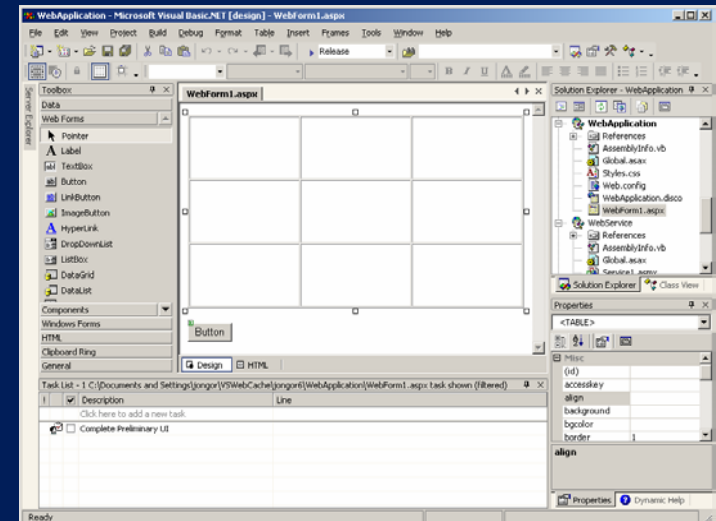
Featuring



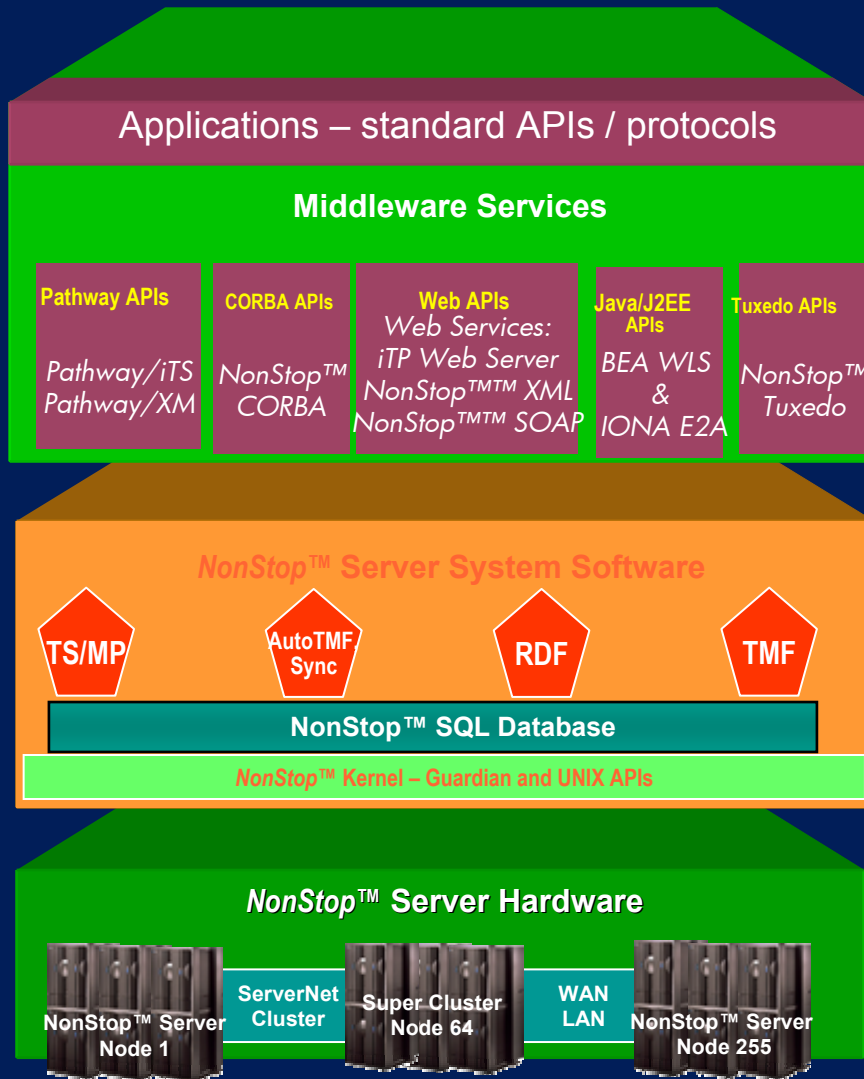
ETK—key Features



- Tight integration with visual studio .NET.
- Support for multiple nonstop™ server specific project types.
- Support for native languages.
 - C, C++, COBOL, pTAL.
 - Compilers run from visual studio .NET or from command line.
- Support for database and middleware.
 - SQL/mp.
 - SQL/MX.
- Complementary tools.
 - Visual inspect (separate license), tandem extension to code Wright, fix include, ar, file transfer, etc.
- Integrated help system.
- Functional replacement of tandem development suite (TDS).



2003 R&D Plan – Key Projects



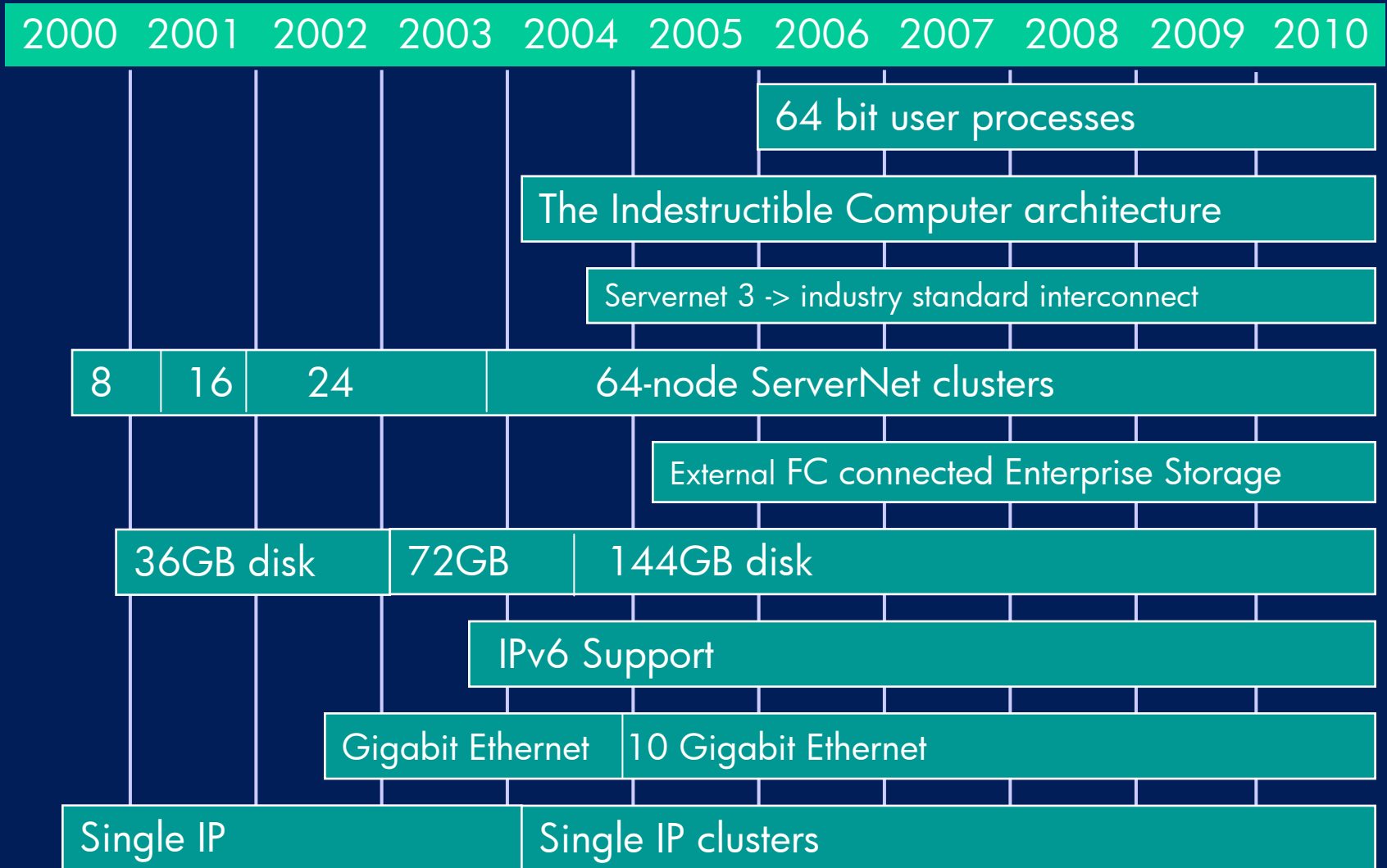
2003

- SQL/MX R2
- Starburst – 64 nodes
- IPV6 Standard
- J2SE (MIPS) - hotspot
- J2EE Platform – BEA WLS
- J2EE Platform – IONA E2A
- OSS Performance/Scale
- Language Development R3
- DLLs
- 72GB 15K RPM

2004+

- S78000/S88000
- IPF based servers
- Enterprise Storage
- New expansion / JBOD
- G4SA
- ISC Constellation IP
- 64-bit NSK on IPF based servers
- Large TMF Audit Trail

Here to 2011



Thought For The Day : Dave Barry



- **Never be afraid to try something new.**
- **Remember that amateurs built the ark**
- **Professionals built the Titanic**



i n v e n t