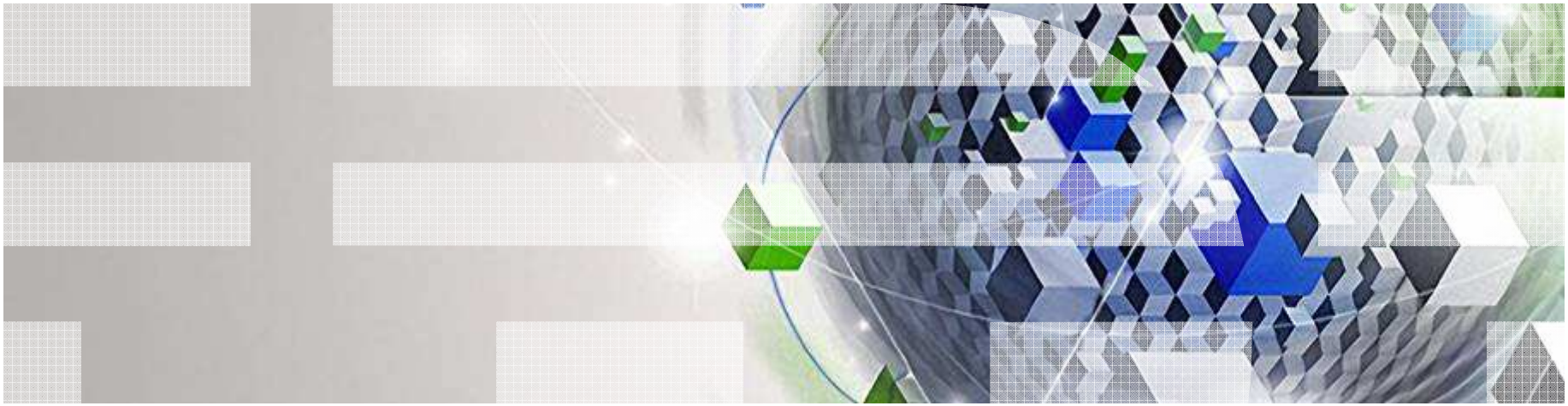
IBM 2010 POWER Announcements
&
Strategy

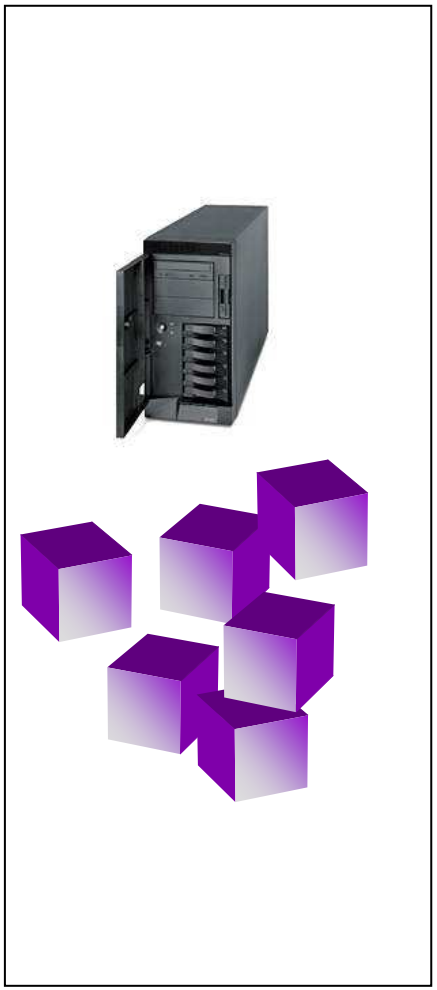
Danny Vandaele



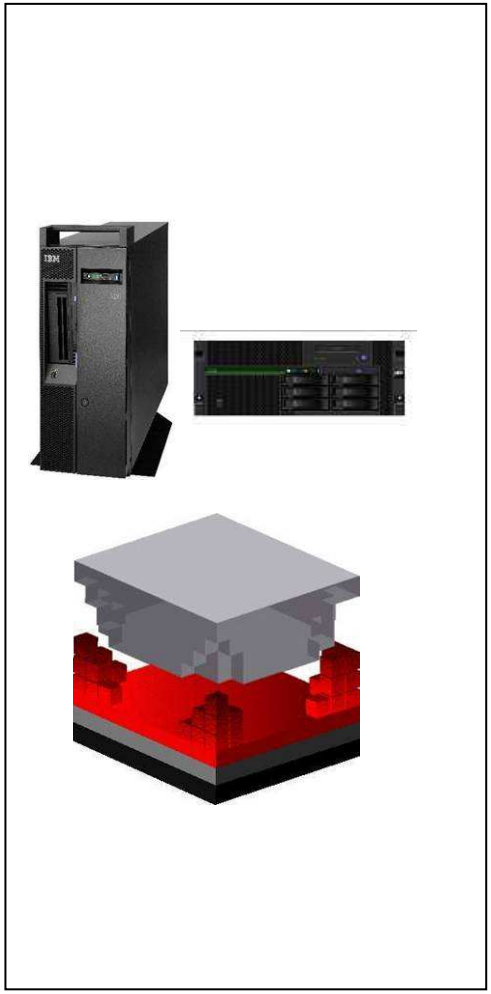
Power your planet.

POWER Strategy

AIX / Linux



IBM i (integration)



Power your planet.

How POWER responds to IT priorities

Virtualization without limits

- ✓ Improve IT infrastructure efficiency
- ✓ Reduce cost and improve service
- ✓ Deploy applications faster

Resiliency without downtime

- ✓ Manage business risk
- ✓ Ensure continuous operations
- ✓ Avoid financial exposures

Management with automation

- ✓ Automate to reduce management costs
- ✓ Focus IT skills on business value
- ✓ Reduce energy costs

Power your planet.

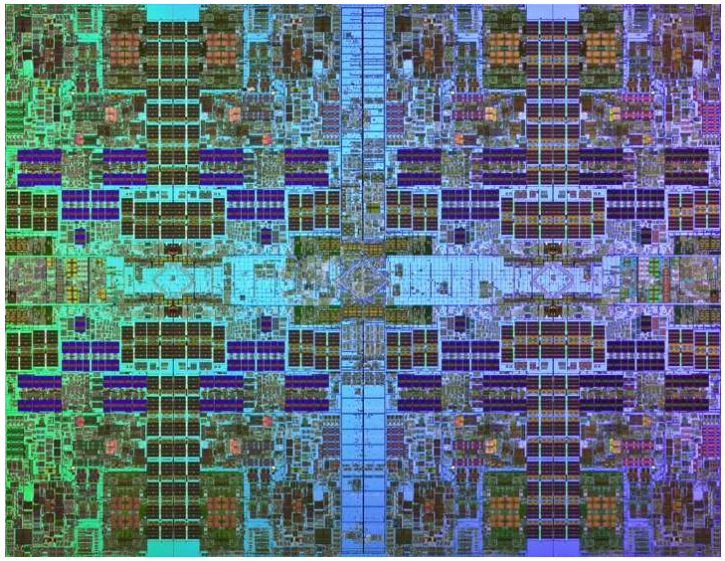
POWER7 Approach to Energy Efficiency

Three steps to approach efficiency by IBM

- ✓**Reduce energy Usage through efficient IT (Utilization)**
  - ✓Invest in Systems that give you :
    - More performance per core
    - More performance per watt
  - ✓Leverage Virtualization and consolidation to increase system virtualization
  - ✓Turn OFF what you are not using
    - EnergyScale technology
      - » Ability to power OFF processor circuit + PCI slots
      - » Throttle fan speed, Processor Voltage, Frequency
- ✓**Know your energy usage (Monitoring)**
  - ✓IBM Active Energy Manager
- ✓**Energy usage must reflect business needs (Managing)**
  - ✓IBM Active Energy Manager

Power your planet.

POWER7 Technology leadership



- ✓ 4, 6 or 8 cores per socket
- ✓ 3.0 to 4.25 GHz
- ✓ Up to 4 threads per core
- ✓ Integrated eDRAM L3 Cache
- ✓ Dynamic Energy Optimization

POWER7 is Workload Optimization

Power Systems offers balanced systems designs that automatically optimize workload performance and capacity at either a system or VM level

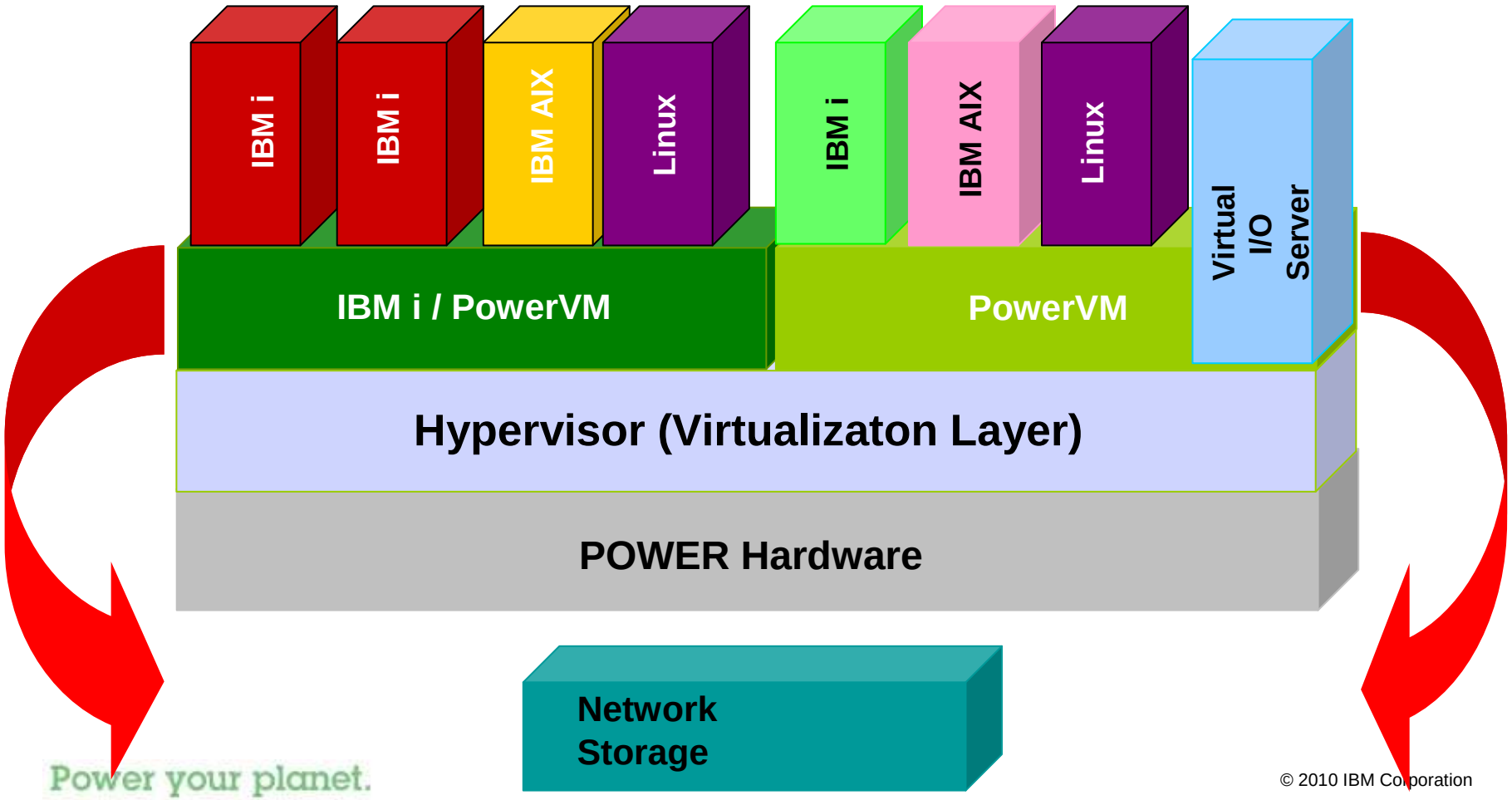
Seven Goals !!!!

- ✓ **Intelligent Threads** utilize more threads when workloads benefit
- ✓ **Intelligent Cache** technology optimizes cache utilization flowing it from core to core
- ✓ **Intelligent Energy Optimization** maximizes performance when thermal conditions allow
- ✓ **Active Memory™ Expansion** provides more memory for SAP
- ✓ **TurboCore™** for max per core performance for databases
- ✓ **MaxCore** for incredible parallelization and high capacity
- ✓ **Solid State Drives** optimize high I/O access applications

Workload-Optimizing Features make POWER7
#1 in Transaction and Throughput Computing

Power your planet.

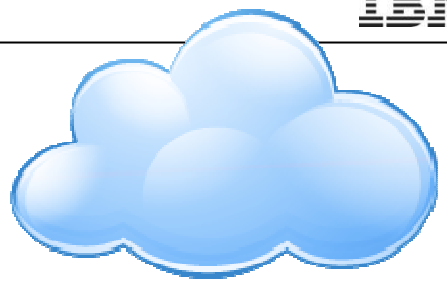
POWER Intelligent utilization of Computing Resources



Power your planet.

Power Hypervisor

for secure cloud computing.



✓ **The PowerVM hypervisor is secure by design**.

IBM is the only vendor who designs the virtualized environment from bare metal through the hypervisor.

✓ **Power Hypervisor is part of our digitally signed firmware**

The strong cryptography makes it impossible to remotely install a modified fileset into the EPROMs (Erasable Programmable Ready Only Memory) of IBM Power Systems.

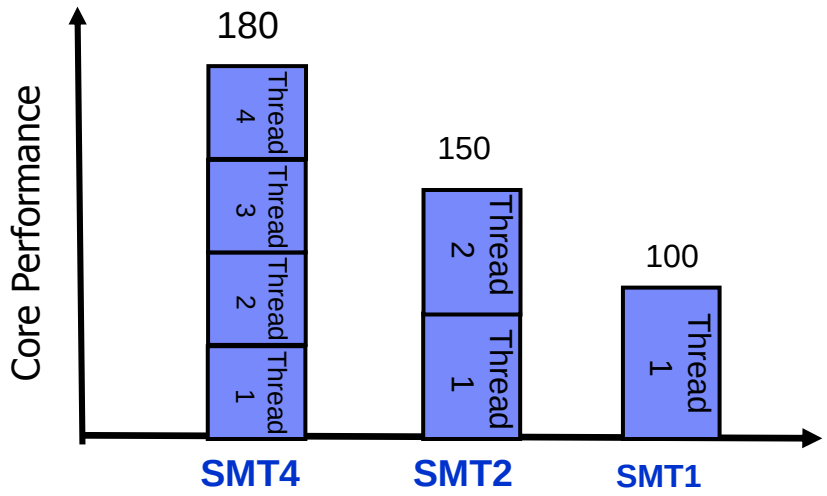
✓ Power virtualization including the hypervisor and the Virtual I/O server has been **Certified for EAL4+ Common Criteria.**

✓ **There are zero common vulnerabilities exposures (CVEs)** reported against Power Hypervisor by US CERT or by MITRE Corporation.

Remember, zero is a number too …
a very good number in the Security domain.

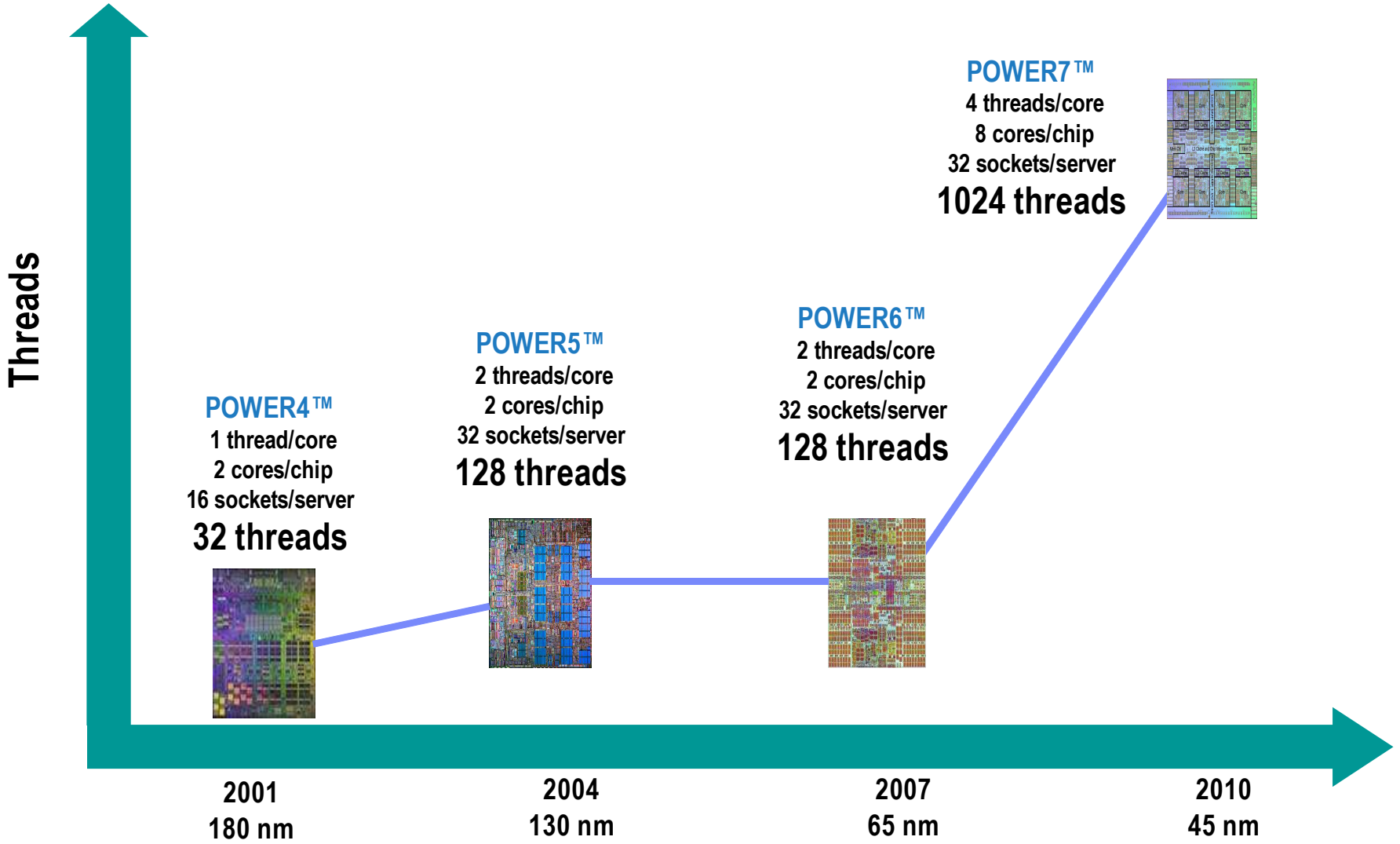
POWER7 Intelligent Threads

- Historically, applications have used homogeneous systems
- In reality, different pieces of code have different needs of performance
  - Applications which do not run in parallel
  - Insufficiently parallelized or legacy applications (e.g. serial transactions within a parallel OLTP system)
  - Parallel applications with load imbalance (e.g. dispatcher thread, shared memory bottlenecks)
  - Serial code segments of parallel applications (e.g. startup, checkpoints, garbage collection)
- POWER7 processor offers multiple modes to optimize workloads
  - Power System Software stack optimizes these modes for different workloads
  - In many cases the optimization is automated; in other cases admin can set manually



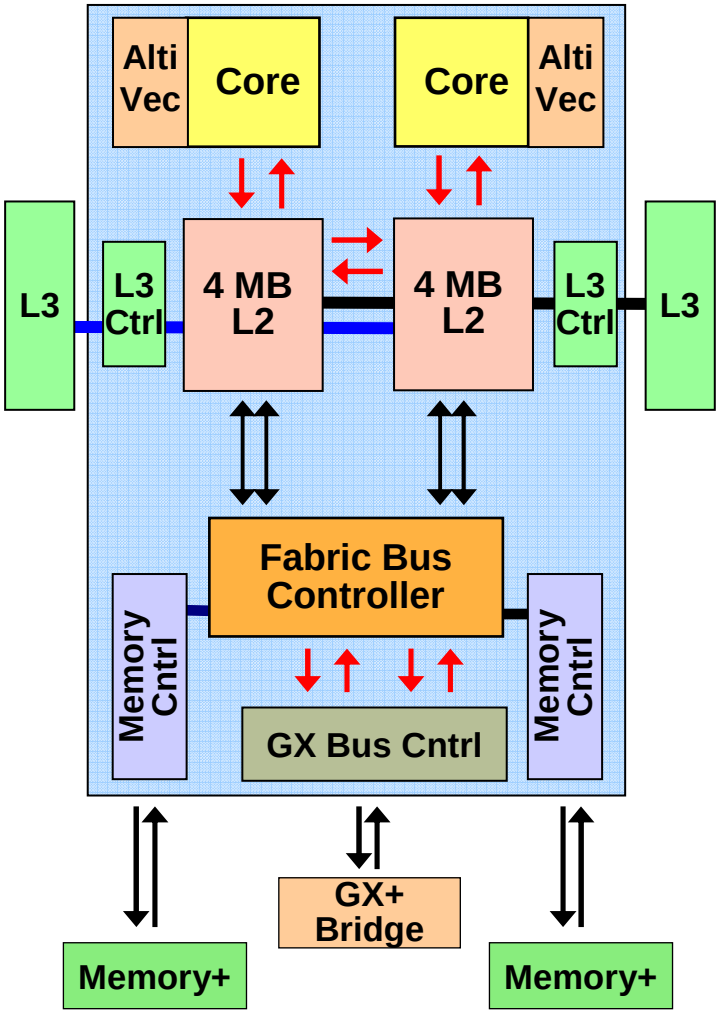
Power your planet.

In 2010 Power Systems Brings Massive Parallelism Mainstream

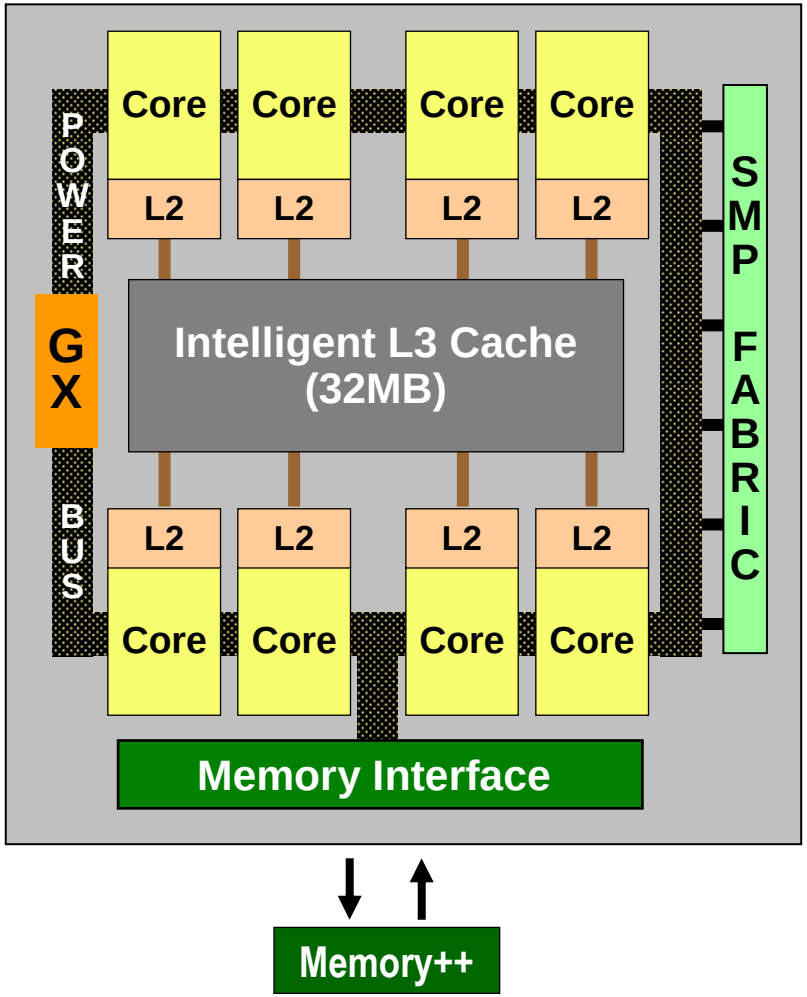


Power your planet.

Level 3 Cache is Virtualized on POWER7



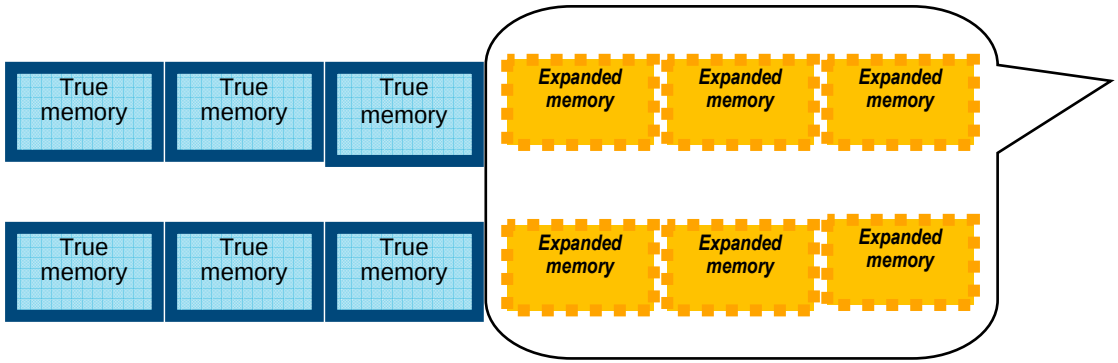
POWER6



POWER7

Power your planet.

POWER7 Active Memory Expansion (AIX)



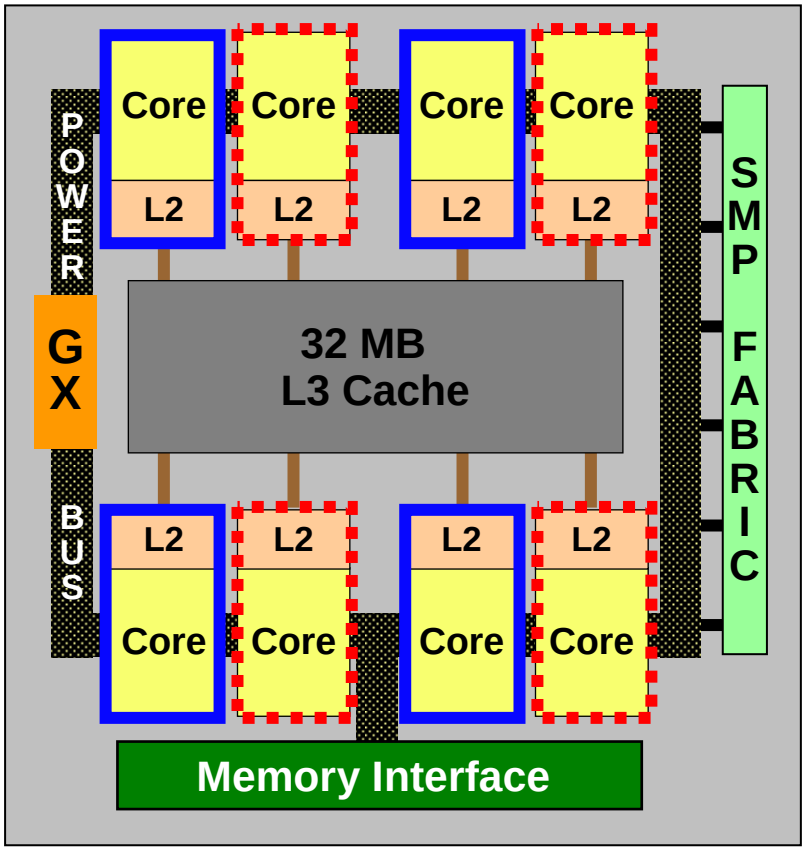
- ✓ Expand memory beyond physical limits
- ✓ More effective server consolidation
  - ✓ Run more application workload / users per partition
  - ✓ Run more partitions and more workload per server

POWER7 Operational switch

MaxCore - TurboCore™ Mode

- ✓ **"Max Core Mode"**
  - ✓ System can be configured to 8 core / socket
  - ✓ 8 MaxCore chips
  - ✓ **L3 = 32 MB (4MB/core)**
- ✓ **"TurboCore Mode"**
  - ✓ 4 available cores / socket
  - ✓ Aggregation of L3 Caches of unused cores.
  - ✓ **L3 = 32 MB (8MB/core)**
  - ✓ **Chips run at higher frequency**
  - ✓ **Power reduction of unused cores**
  - ✓ Performance gain over POWER6 provides up to 1.5 x per core to core

POWER7 Chip



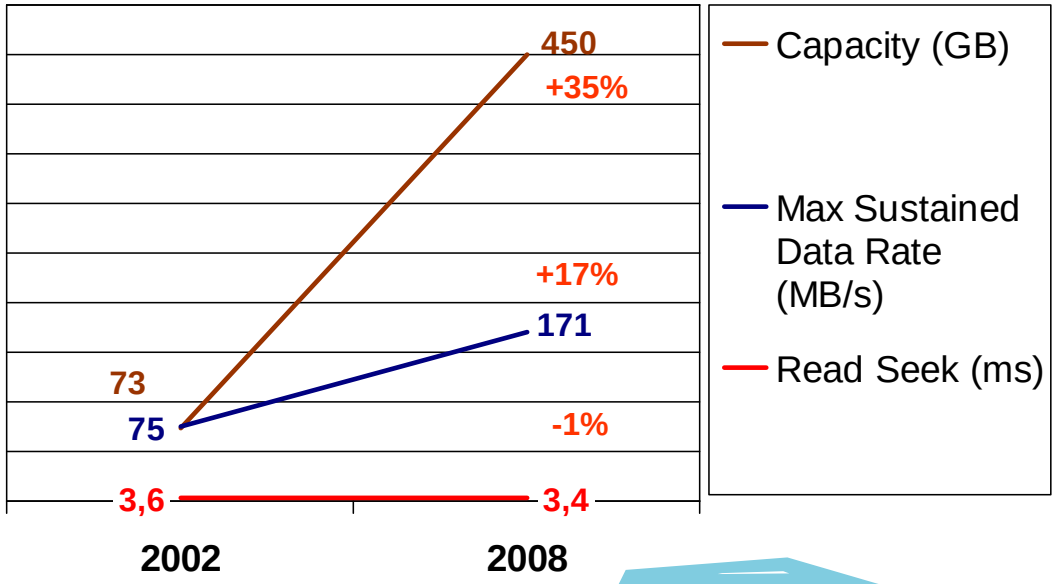
TurboCores

Unused Core

Power your planet.

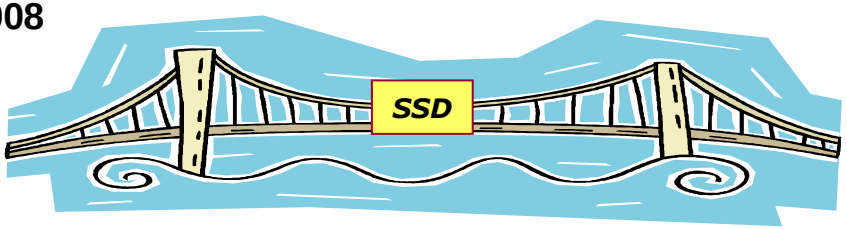
SSD (Solid State Drives)

Seagate 15k RPM/3.5" Drive Specifications



HDD (Hard Disk Drives)

Continue to provide value on a $ per GB metric …. **but are getting worse on an I/O per GB metric**



Processors	Memory		Disk
Very, very, very, very, very fast	Very, very, very fast	Fast	Very, very slow comparatively
≤ 10's ns	~100 ns	~200,000 ns	1,000,000 - 8,000,000 ns
Access Speed			

Power your planet.

Power System Internal Disks

- ✓ **Integrated with IBM i**
  - ✓ Native attach
  - ✓ Virtualized:
    - ✓ Virtual I/O Server (VIOS)
    - ✓ IBM i Hosting i

SFF HDD	Current IBM i Options	
15k	139 GB #1888	✓½ the energy of 3.5-inch disk drives, reduced space
10k	283 GB #1911	

3.5 HDD	Current IBM i Options	
15k	139 GB #1888	• Traditional 3.5-inch disk drives
15k	283 GB #3678	
15k	428 GB #3658	

SSD

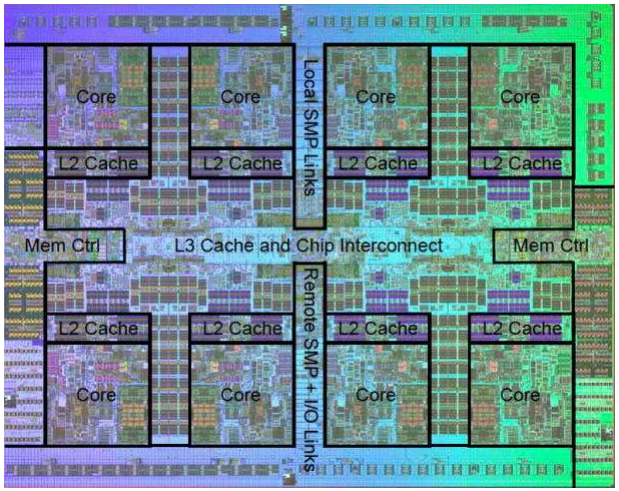
- Typically around 200 microseconds vs. >2 milliseconds for HDDs
- 520, 550, 560, 570, 575, 595
- 710/720/730/740/750/770/780
- IBM i 5.4, 6.1, 7.1

PCIe-Based SSD

- 4 SSD bays on card: 1, 2 or 4 SSD modules per adapter
- 177 GB per SSD module / Up to 708 GB per card
- IBM i 7.1 and 710/720/730/740/750/770/780

Power your planet.

POWER7 Multi Mode Switch (technology mode)



POWER6™ BUILT ON Power™

POWER7 BUILT ON Power™

POWER7 recognizes O/S functions

AIX 5.3 — i for Business 6

AIX 5.2*

*Running in WPAR on AIX 7

i for Business 7 — AIX 6 — AIX 7

Power your planet.

Power Systems – August 2010

Power 595
Power 795

Power 780

Power 570
Power 770

Power 550
Power 750

Power 560

Power 575

HPC

Power 755

Power 520
Power 720/740

POWER5 510
Power 710/730

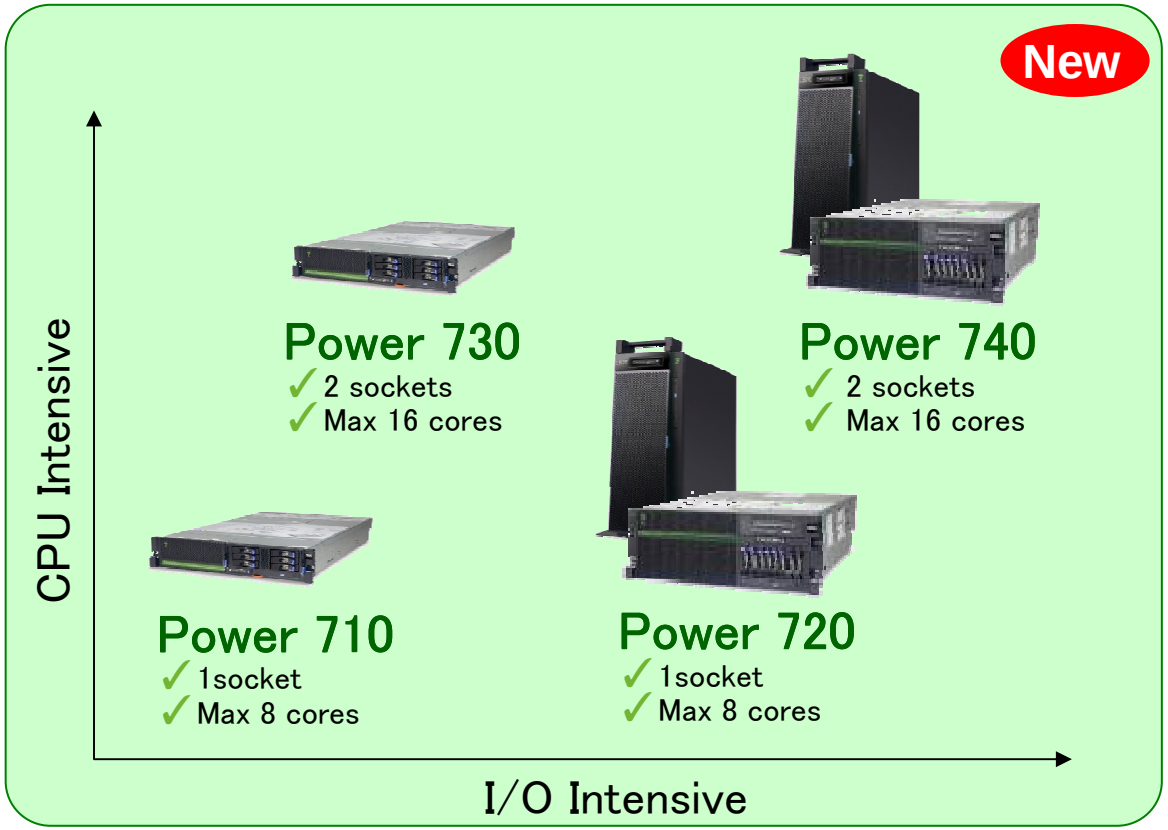
JS Blades
PS Blades

Power your planet.

Power Systems Express Servers

Workload Optimized

BladeCenter PS 70x
- ✓ 1 or 2 sockets
- ✓ Max 16 cores



Power 750
- ✓ 4 sockets
- ✓ Max 32 cores

Power your planet.

Power 710 / 730 Express Packaging Options (2U high)

Six SFF bays with Media

Three SFF bays with Tape and Media

Power your planet.

Power your planet with Power Systems Express servers

1 Socket

IBM i Per User Licensing

Power® 710 Express

New

Power 720 Express

New

2 Socket

IBM i Per processor licensing

New

Power 730 Express

Power 740 Express

New

3 year warranty !!

POWER Blades

1 socket

2 socket

IBM i Per User Licensing

PS700, PS701, PS 702 Express

4 Socket

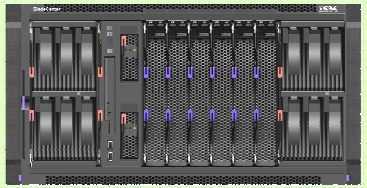
1 year warranty !!

Power 750 Express

IBM i, AIX, Linux Per processor licensing

Supporting POWER in BladeCenter

BladeCenter S



SMB
Branch Office

BladeCenter E

High density

Lowest cost,
Power efficient

BladeCenter H

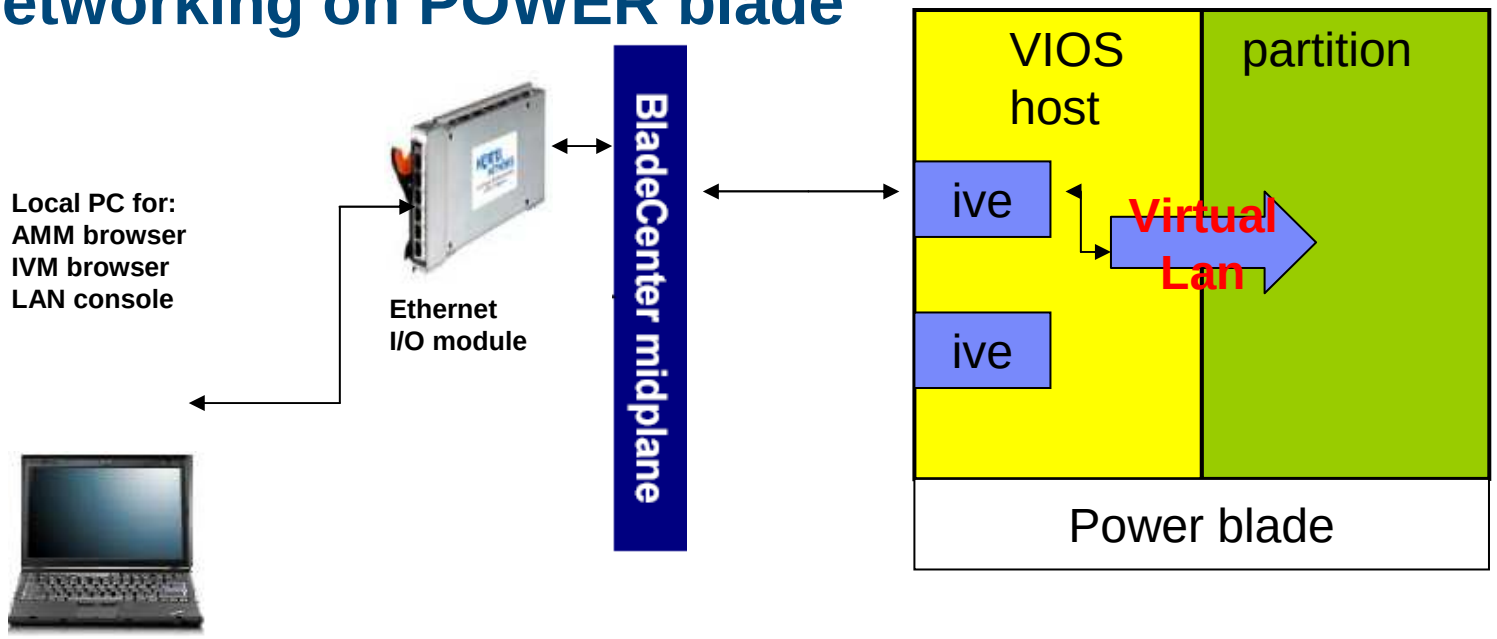
High density

Ultra high performance, >10GB

← Workload Transition SMB Enterprise High Performance →

Power your planet.

Networking on POWER blade



- ✓ VIOS is accessed from local PC via embedded Ethernet ports on blade (IVE/HEA)
  - For both IVM browser and VIOS command line
- ✓ For connectivity, IVE/HEA port is bridged to Virtual Ethernet LAN
  – Referred to as a shared Ethernet adapter (SEA)

Processor Offerings for Rack

POWER7 Processor Offerings			
Cores / Socket	4	6	8
PS700	**Yes**	**-**	**-**
PS701 / PS702	**-**	**-**	**Yes**
Power 710 / 730	**Yes**	**Yes**	**Yes**
Power 720 / 740	**Yes**	**Yes**	**Yes**
Power 750	**-**	**Yes**	**Yes (3)**

Power your planet.

NEW Generation of Power Rack Systems

IBM Power 750 Express

- An Energy Star-qualified server with up to 32 POWER7 cores
- Over 3X the SAP performance or all other 4-socket servers
- 4X to 7X the energy efficiency of Sun SPARC and HP Integrity

IBM Power 755 for HPC

- HPC cluster node with 32 POWER7 cores
- Energy Star—qualified for exceptional energy efficiency, and optimized for the most challenging analytic workloads

Power your planet.

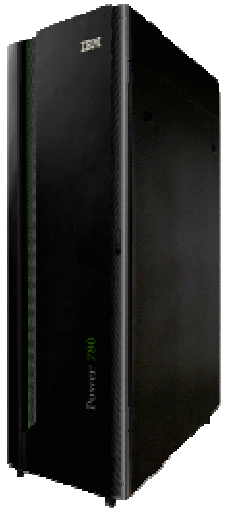
NEW Generation of Modular Power Systems

IBM Power 770

- Modular enterprise server with up to 64 POWER7 cores
- More performance per core, up to 70 percent less energy

IBM Power 780

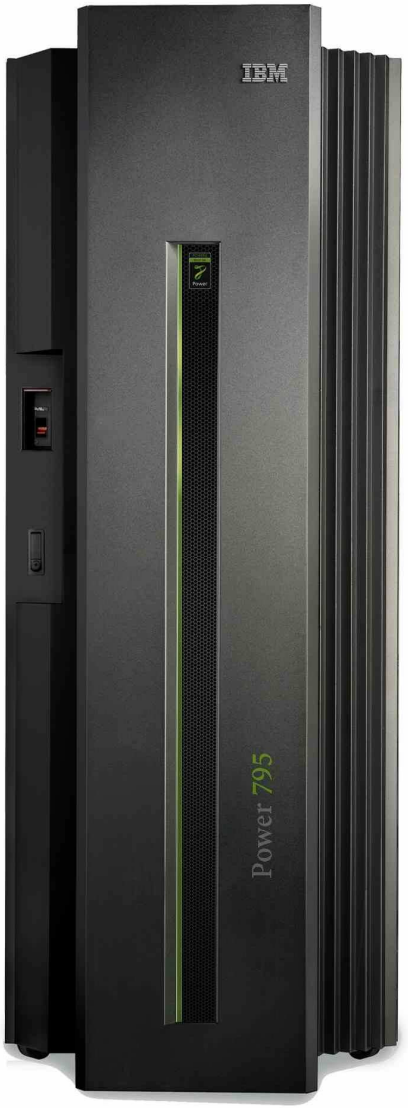
- New category of scalable high-end servers, featuring an advanced modular design with up to 64 POWER7 cores
- New TurboCore™ workload optimizing mode that maximizes per core database performance



Power your planet.

NEW High End Power 795

- ✓ 24 to 256 Cores
- ✓ 8 TB memory
- ✓ TurboCore
- ✓ 3.7, 4.0 or 4.25 GHz
- ✓ Capacity on Demand
- ✓ Enterprise RAS
- ✓ 24x7 Warranty
- ✓ PowerCare



Power your planet.

Processor Offerings for Modular Systems

	POWER7 TurboCore / CoD Processor Offerings		
Cores / Socket	**4 TurboCore**	**6**	**8 MaxCore**
Power 770	-	Yes	Yes
Power 780	Yes		Yes
Power 795	Yes	Yes	Yes

Power your planet.

POWER7 Performance figures

Power710	4-core	23.800 cpw	3.0GHz
Power710	4-core	27.900 cpw	3.7GHz
Power710	6-core	40.900 cpw	3.7GHz
Power710	8-core	51.800 cpw	3.55GHz

Power720	4-core	23.800 cpw	3.0GHz
Power720	6-core	34.900 cpw	3.0GHz
Power720	8-core	46.300 cpw	3.0GHz

Power your planet.

POWER7 RAS Feature Overview

● Standard
■ Optional
– Not Available

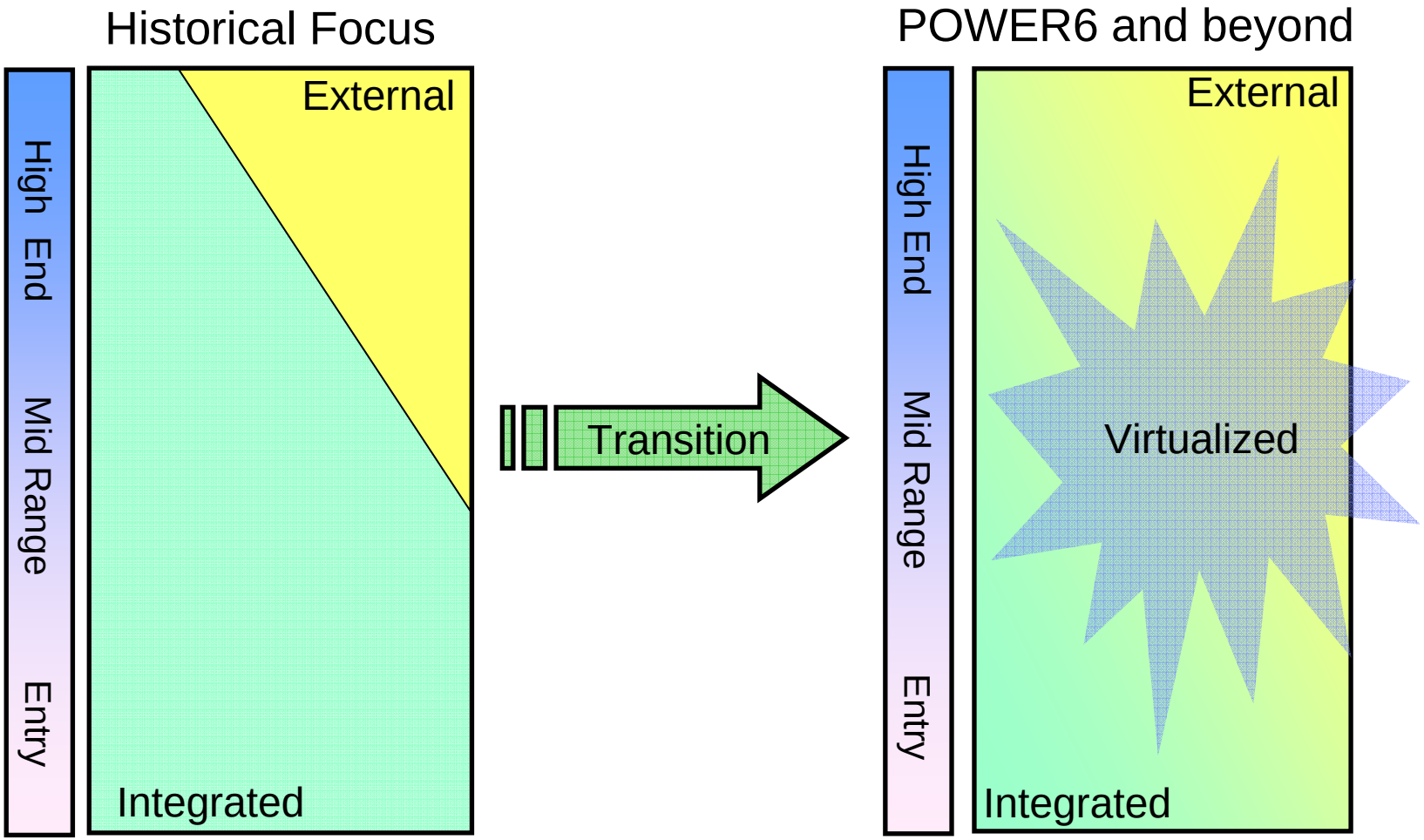
** Requires two or more nodesb*

RAS Item	Power 750	Power 770	Power 780	Power 595	Power 795
Redundant / Hot Swap Fans & Blowers	●	●	●	●	●
Hot Swap DASD / Media / PCI Adapters	●	●	●	●	●
Concurrent Firmware Update	●	●	●	●	●
Redundanbt / Hot Swap Power Supplies	■	●	●	●	●
Dual disk controllers (split backplane)	■	●	●	●	●
Processor Instruction Retry	●	●	●	●	●
Alternate Processor Recovery	●	●	●	●	●
Storage Keys	●	●	●	●	●
PowerVM™/Live Part. Mobility/Live App Mobility	■	■	■	■	■
Redundant Service Processors	–	●*	●*	●	●
Redundant System Clocks	–	●*	●*	●	●
Redundant / Hot Swap Power Regulators	–	●	●	●	●
Dynamic Processor Sparing	–	■	■	■	■
Memory Sparing	–	■	■	■	■
Hot GX Adapter Add and Cold Repair	–	●	●	●	●
Hot-node Add / Cold-node Repair	–	●*	●*	●	●*
Hot-node Repair / Hot-memory Add	–	●*	●*	●	●*
Dynamic Service Processor &System Clock Failover	–	●*	●*	●	●
Hot-node Repair / Hot-memory Add for all nodes**	–	●*	●*	●	●*
Enterprise Memory	–	●	●	●	●
Hot GX Adapter Repair	–	●	●	–	●
Midplane connection for inter-nodal communication	–	–	–	●	●
Active Memory Mirroring for Hypervisor	–	–	–	–	●

Power your planet.

IBM Power Systems Storage for POWER: Now

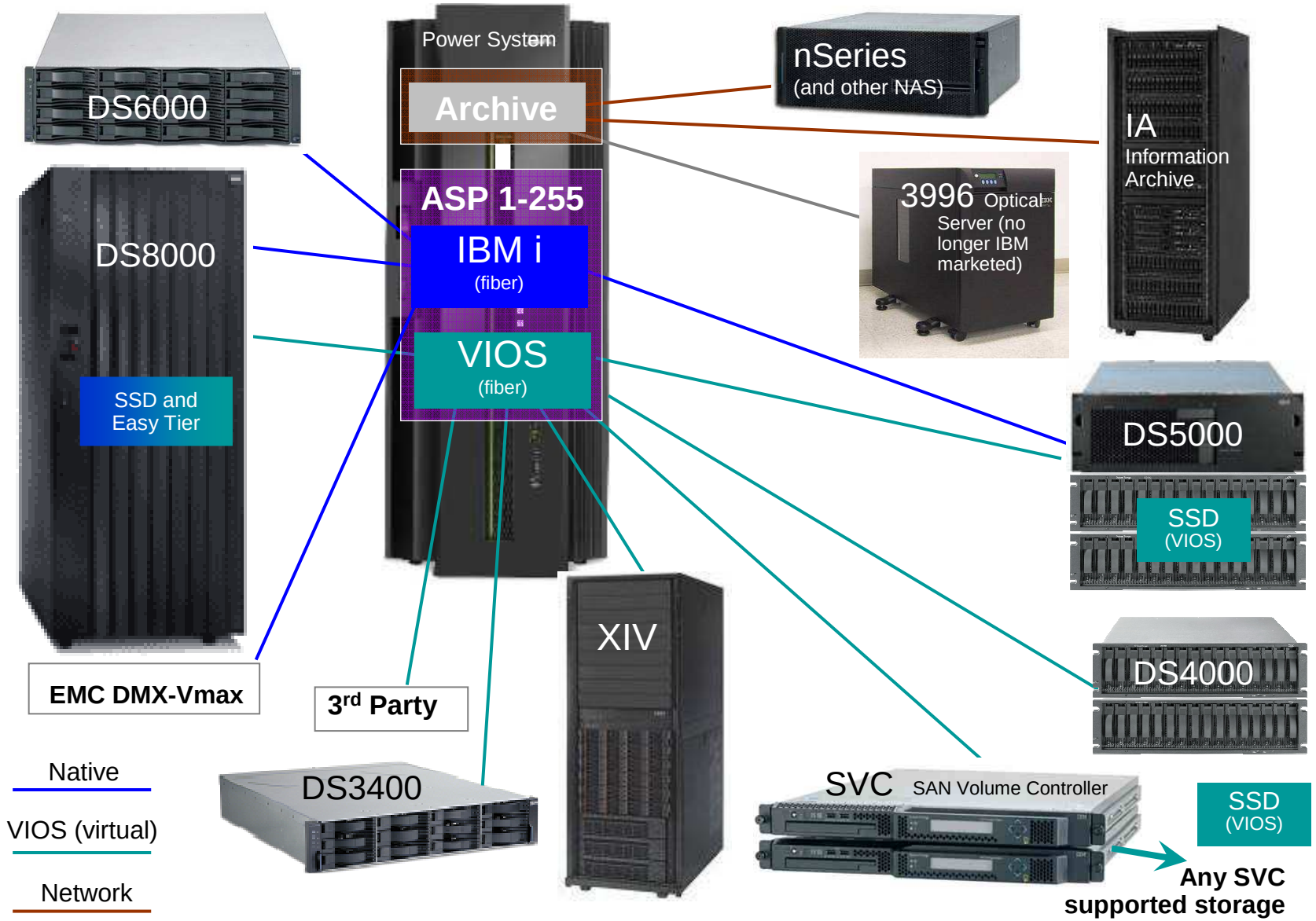
Long term investment for internal, external and virtualized storage for IBM i, AIX, Linux



SAN, Virtual, and Integrated can combine HDDs and SSDs.

Power your planet.

External Disk Storage Servers for IBM i



Power your planet.

Storwize V7000

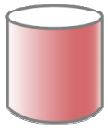
- ✓ **Available in 12 or 24 drive enclosures**
- ✓ **Thin Provisioning** – Included
- ✓ **FlashCopy** – Included
- ✓ **Easy Tier** – Included
- ✓ **Virtualization technology** - Included

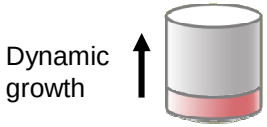
Power your planet.

Efficiency Features

- ✓More productive use of available storage
- ✓Across all supported host platforms

Thin provisioning

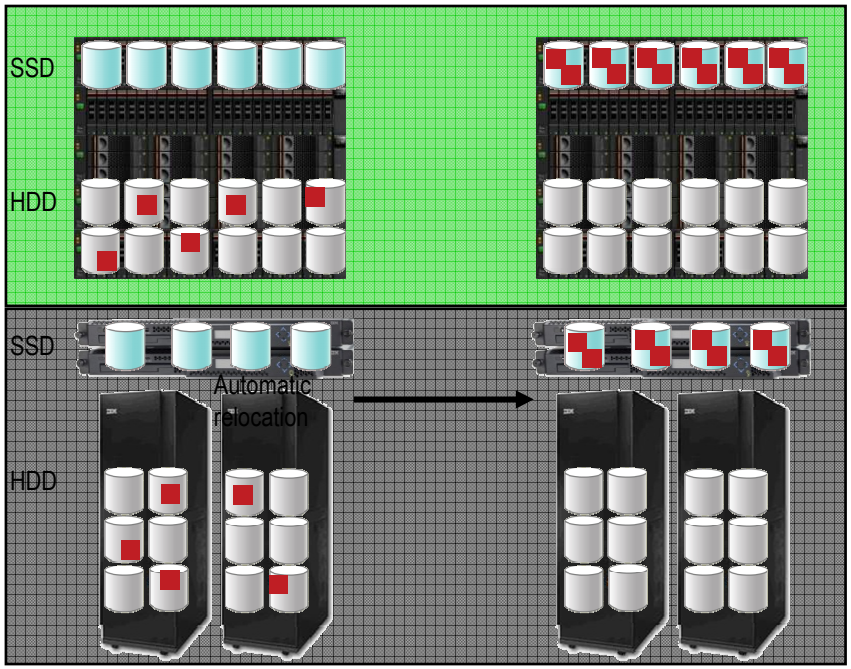




Without thin provisioning, pre-allocated space is reserved whether the application uses it or not.

With thin provisioning, applications can grow dynamically, but only consume space they are actually using.

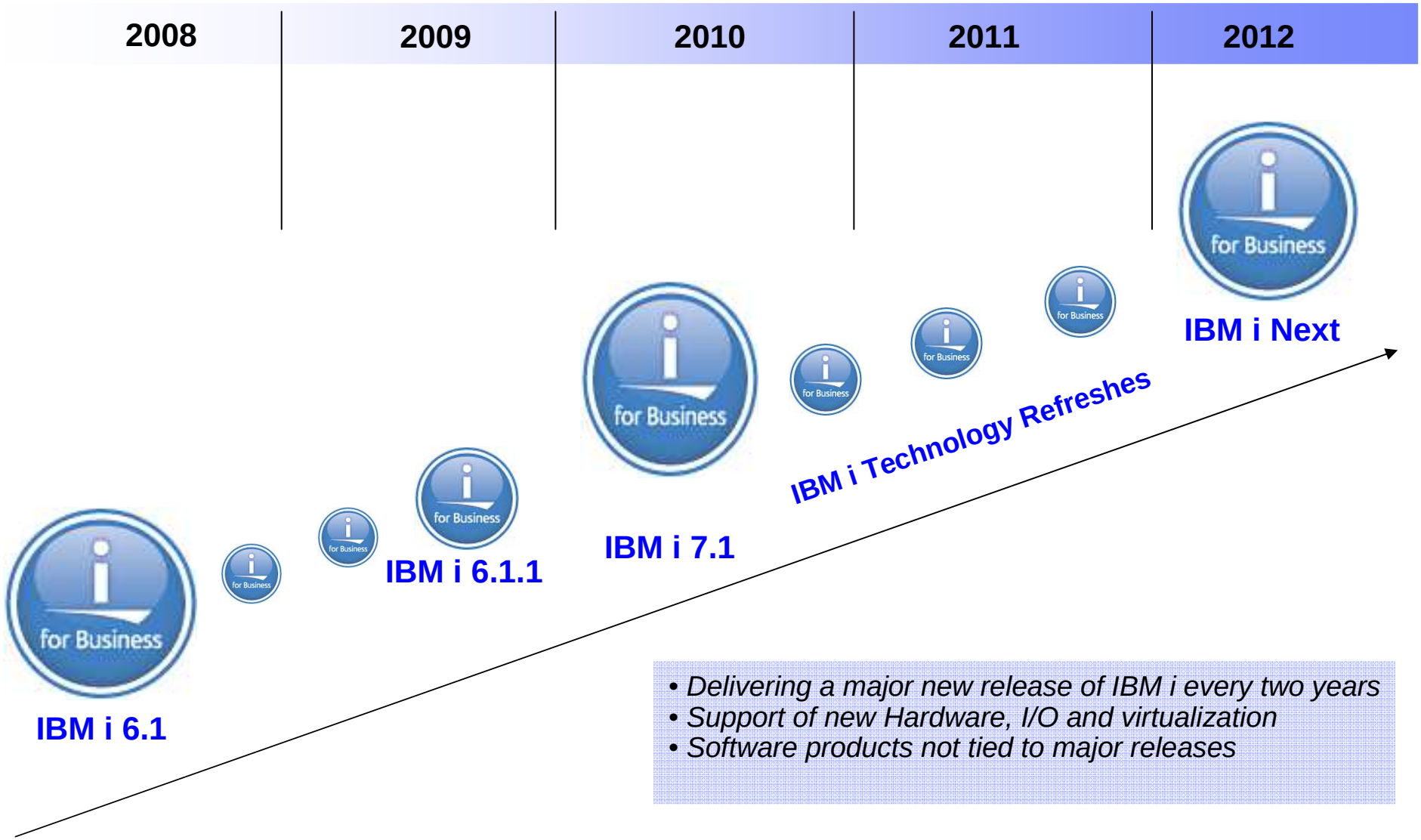
Easy Tier



- ✓"Easy Tier" pools identify the busiest data extents and automatically relocate them to highest performing Solid-state Disks
- ✓Remaining data extents can take advantage of higher capacity, price optimized disks

Power your planet.

IBM i Roadmap



Power your planet.

POWER7 IBM i Offering Portfolio & System Support

Tier	Model	Processor Group
Large	**795** 780	P50
Medium	770	P30
Small	750 **740** **730**	P20
	720 6/8-core **710 6/8-core** PS701/702	P10 User Based
	720 4-core **710 4-core** PS700	P05 User Based

Servers	i 5.4	i 6.1	i 7.1
POWER7		✓	✓
POWER6+ Blades, 520*, 550*, 560		✓	✓
POWER6 520, 550, 570, 595	✓	✓	✓
POWER5/5+	✓	✓	✓
800, 810, 825, 870, 890	✓	✓	

*US list price

Power your planet.

IBM i POWER7 new packaging

- ✓ **IBM i delivers complete support of POWER7 portfolio with POWER7 Processors offering more performance, energy efficiency and scalability**

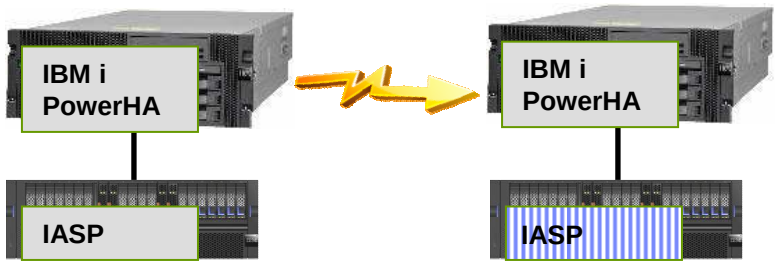
  - ✓ **IBM i Express Edition** offers IBM i without DB2 for application and infrastructure serving
  - ✓ **IBM i Standard Edition** offers an integrated operating environment for business processing, DB2 included
  - ✓ **IBM i Enterprise Edition** offers IBM i plus Enterprise Enablement which provides 5250 transaction processing support

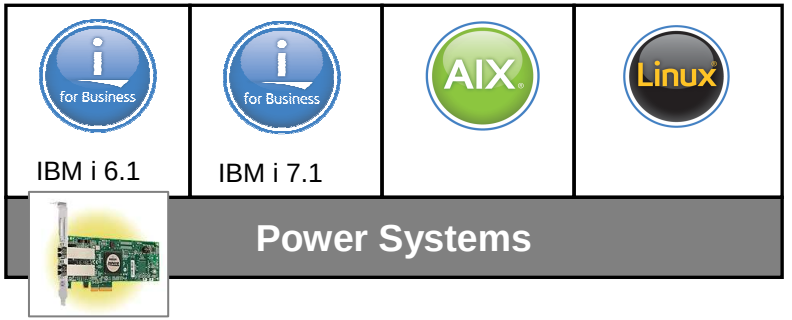
Power your planet.

IBM i 7.1 Announcement Highlights

- ✓ **DB2**
  - ✓ Support for XML and column level encryption
- ✓ **PowerHA**
  - ✓ Async Geographic Mirroring & LUN-level switching
- ✓ **Virtualization**
  - ✓ IBM i 6.1 virtualization for i 7.1 partitions
- ✓ **Solid State Drives**
  - ✓ Automatic movement of hot data to SSDs
- ✓ **Open Access for RPG**
  - ✓ Extend application reach to pervasive devices
- ✓ **Zend Server Community Edition**
  - ✓ PHP environment preloaded with IBM i
- ✓ **Systems Director Navigator**
  - ✓ Richer management of IBM i via Systems Director Navigator

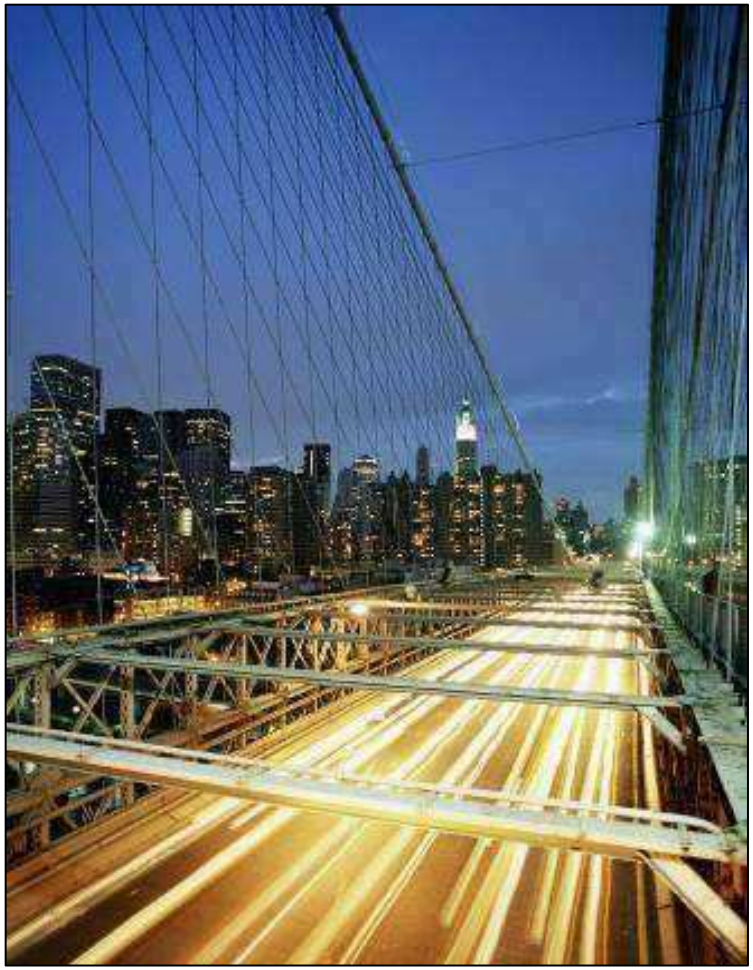
PO #	Customer #	Date	Credit Card	Purchase Order
123	2468	5/27/09	&#^$&$^	~ XML ~





Announce April 13
GA April 23

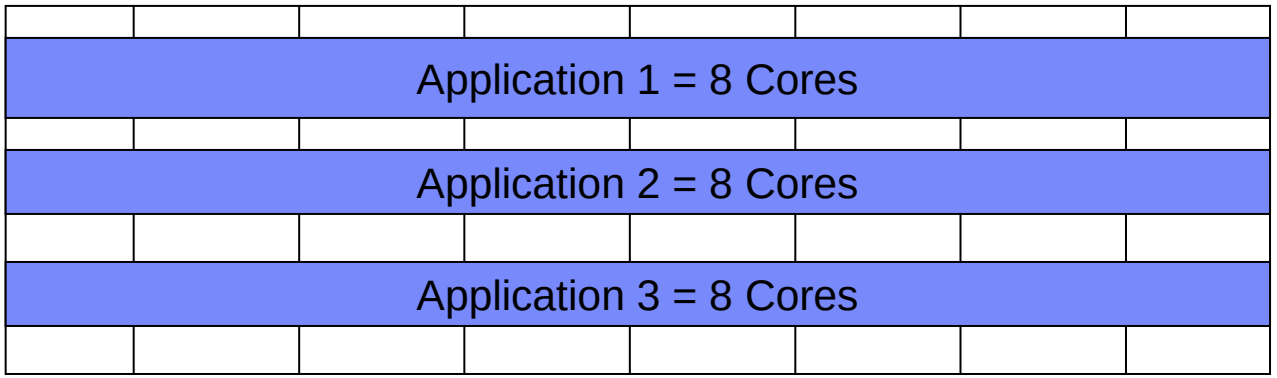
Power your planet.



IBM i Workload Capping

IBM i Today

- ✓ **IBM i Workload Management**
  - ✓ Subsystems provide workload isolation
  - ✓ Priorities are used to schedule work
  - ✓ No way to cap a given application to a subset of the processor resources in a partition
- ✓ **All workloads can access the full number of Cores in the Partition**

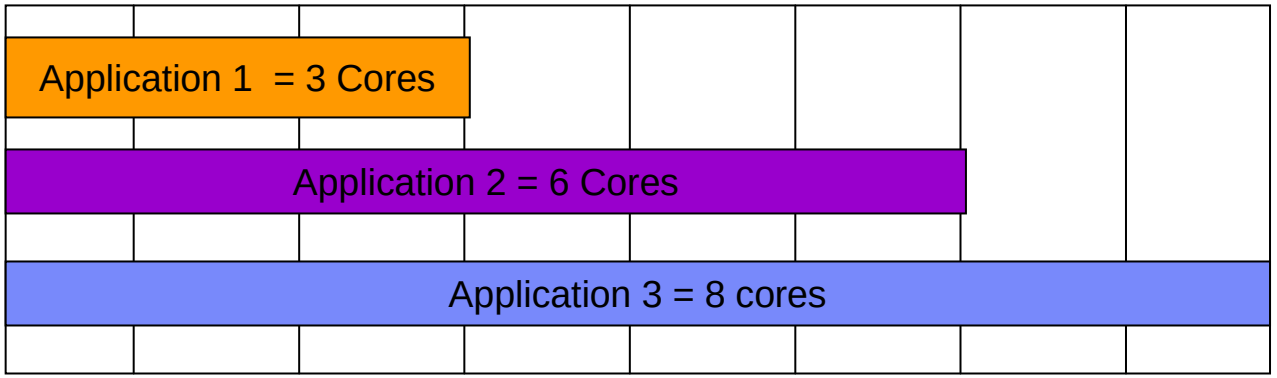


IBM i System / Partition

- Virtually all customers run multiple applications on a single IBM i
- Consistent with integrated value proposition

IBM i Sub – LPAR licensing

- **Method for users to limit the amount of processing capacity for a Workload**.
  - A workload is defined as a job, subsystem, or product
  - **Conceptually if a workload is capped at 1 processor core on a multi core system, the capped workload should respond as if its running on a single core 520**
- **Availability:** Aug 2010 for IBM i 7.1, YE2010 for IBM i 6.1



IBM i System / Partition

- **Customer licenses a product for less cores** then are in the partition. The OS then enforces that licensing using the workload capping support.

  - Works within a Single IBM i system / partition
  - Supported across IBM i subsystems
  - Limits placed at the whole processor-core level

Resiliency Without Downtime -- PowerHA

High availability solutions for IBM AIX, and IBM i

www.ibm.com/systems/power/software/availability

Power your planet.

IBM Director : PowerHA Management Interface

State-of-the-art interface

- ✓ No charge plug-in
- ✓ Masks complexity
- ✓ Central management
- ✓ Real-time status
- ✓ Smart Assist integration
- ✓ Deployment wizards

IBM® Systems Director

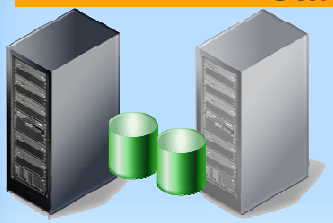
PowerHA™

Power your planet.

IBM Multi System Data Resiliency for i

- **PowerHA SystemMirror for i**
- Strategic HA/DR solution for i
- Easy to use on-demand role swap operations

Standard Edition



- LUN level clustering
- IBM i Synchronous Geographic Mirroring

Geographic Mirroring Cluster

- IBM i based replication
- Asynchronous 7.1
- Storage agnostic

Metro Mirror/Global Mirror Cluster

- Storage based
- Metro Mirror
- Global Mirror
- FlashCopy

Enterprise Edition

Logical Replication

- Software based
- iCluster
- Journal based replication
- Concurrent access

Basic San Copy Services

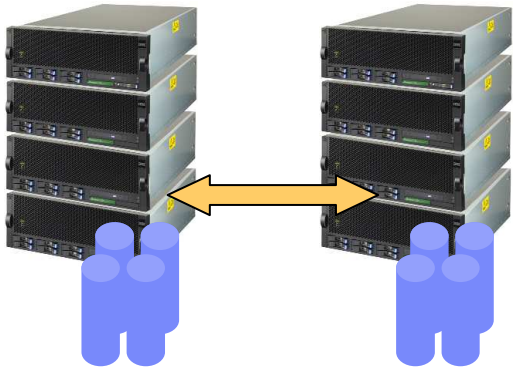
- SAN Based
- Global Mirror
- Boot From SAN
- DR/Tape Backup

Power your planet.

PowerHA SystemMirror Editions

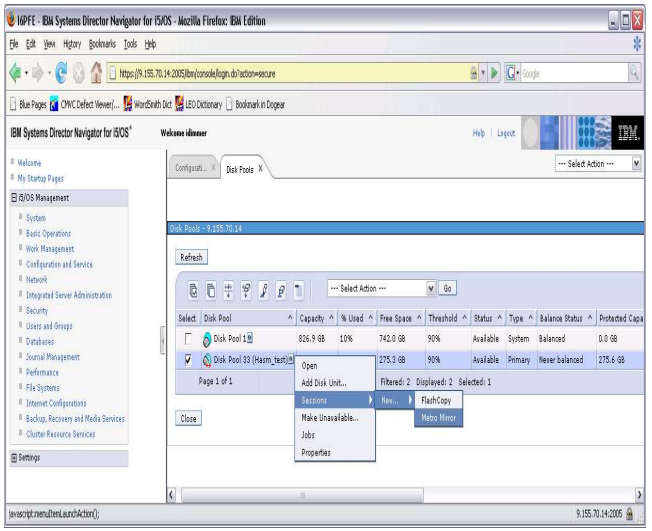
PowerHA SystemMirror for i Standard Edition
Targeted at data center high availability solutions

- ✓ Cluster management for the **data center**
  - ✓ Monitors, detects and reacts to events
  - ✓ Establishes a heartbeat between the systems
  - ✓ Enables automatic switch-over
- ✓ IBM shared storage clustering
  - ✓ Can enable near-continuous application service
  - ✓ Minimize impact of planned & unplanned outages
  - ✓ Ease of use for HA operations



PowerHA SystemMirror for i Enterprise Edition
Adds support for multi-site high availability and disaster recovery solutions

- ✓ Cluster management for the **Enterprise**
  - ✓ Multi-site cluster management
  - ✓ Includes the Standard Edition function
  - ✓ Optimized for IBM storage
  - ✓ Geographic mirroring async mode

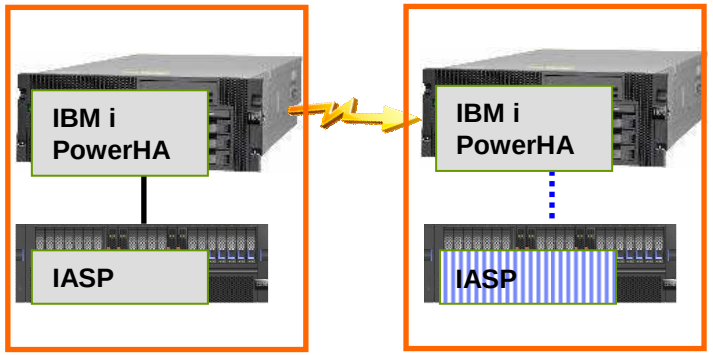


Power your planet.

PowerHA SystemMirror for i

✓ Asynchronous Geographic Mirroring for multi-site DR solution

- ✓ IBM i based mirroring for geographically dispersed systems
- ✓ Asynchronously mirrors disk writes to target system
- ✓ Support for automatic failover
- ✓ Supports IASPs on integrated disk, SAN, and virtual disk

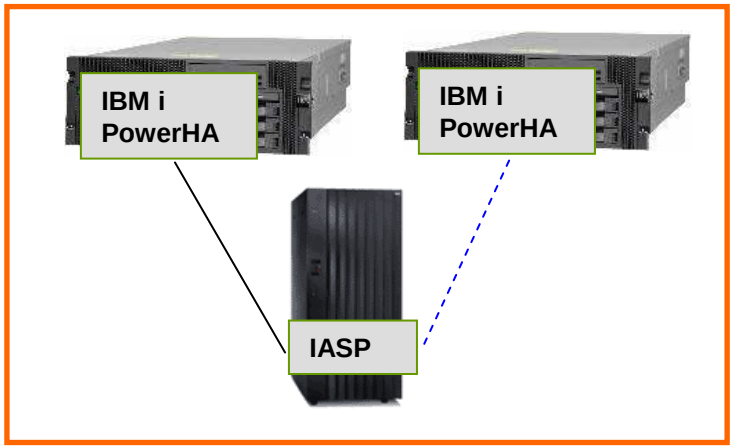


✓ Space-Efficient Flash Copy

- ✓ Working with IBM DS8000 function to allow Flash Copy without requiring double DASD

✓ LUN level switching for local HA solution

- ✓ Switch IASP on DS8000 or DS6000 between local systems
- ✓ Support for automatic failover
- ✓ Supports native and VIOS with NPIV attached SANs

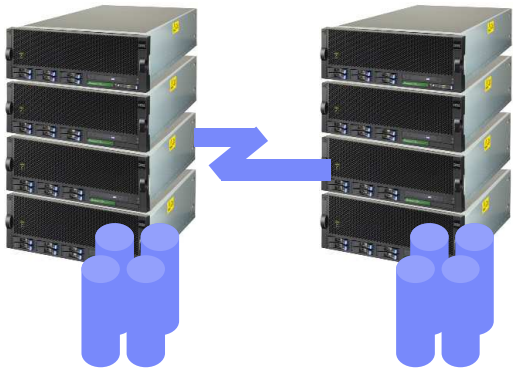


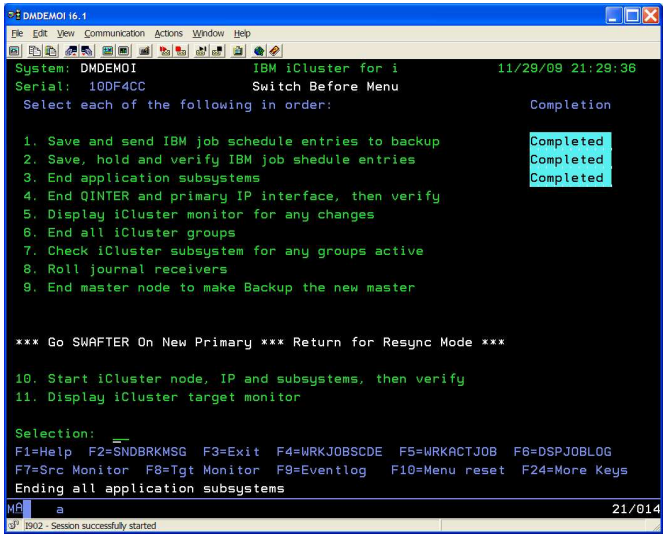
PowerHA provides a robust, simple to manage High Availability and Disaster Recovery solution

Power your planet.

iCluster for IBM i

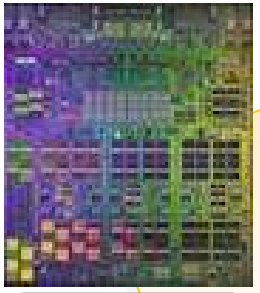
- ✓ **iCluster**
- ✓ **IBM's software based HA/DR offering for IBM i**
  - ✓ Traditional i approach for data replication
  - ✓ Enables recovery at secondary systems
  - ✓ Enables off line backup operations
- ✓ **Logical replication based data resiliency**
  - ✓ Remote journaling for DB2 objects
  - ✓ Audit journal replication for non DB2 objects
- ✓ **HA Assist (5733-HAA)**
  - ✓ Compliments PowerHA for IBM i
  - ✓ Replicates objects not supported via IASPs
  - ✓ iCluster for i code base





Power your planet.

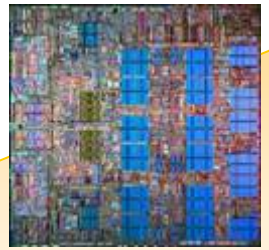
IBM POWER Processor Roadmap



POWER4/4+

First Dual Core in Industry
- 1-16 Sockets
- Dual Core
- Chip Multi Processing
- Distributed Switch
- Shared L2
- Dynamic LPARs (32)
- 180nm, 130nm

2001



POWER5/5+

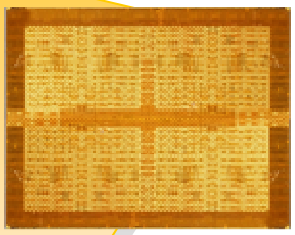
Hardware Virtualization for Unix & Linux
- 1-32 Sockets
- Dual Core & Quad Core Md
- Enhanced Scaling
- 2 Thread SMT
- Distributed Switch +
- Core Parallelism +
- FP Performance +
- Memory bandwidth +
- 130nm, 90nm

2004

POWER6/6+

Fastest Processor In Industry
- 1-32 Sockets
- Dual Core
- High Frequencies
- Virtualization +
- Memory Subsystem +
- Altivec
- Instruction Retry
- Dyn Energy Mgmt
- 2 Thread SMT +
- Protection Keys
- 65nm

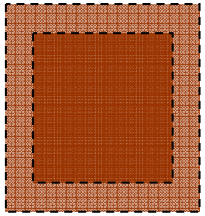
2007



POWER7/7+

Most POWERful & Scalable Processor in Industry
- 1-32 Sockets
- 4,6,8 Core
- 32MB On-Chip eDRAM
- Power Optimized Cores
- Mem Subsystem ++
- 4 Thread SMT++
- Reliability +
- VSM & VSX
- Protection Keys+
- 45nm, 32nm

2010



POWER8

- **Concept Phase**

Future

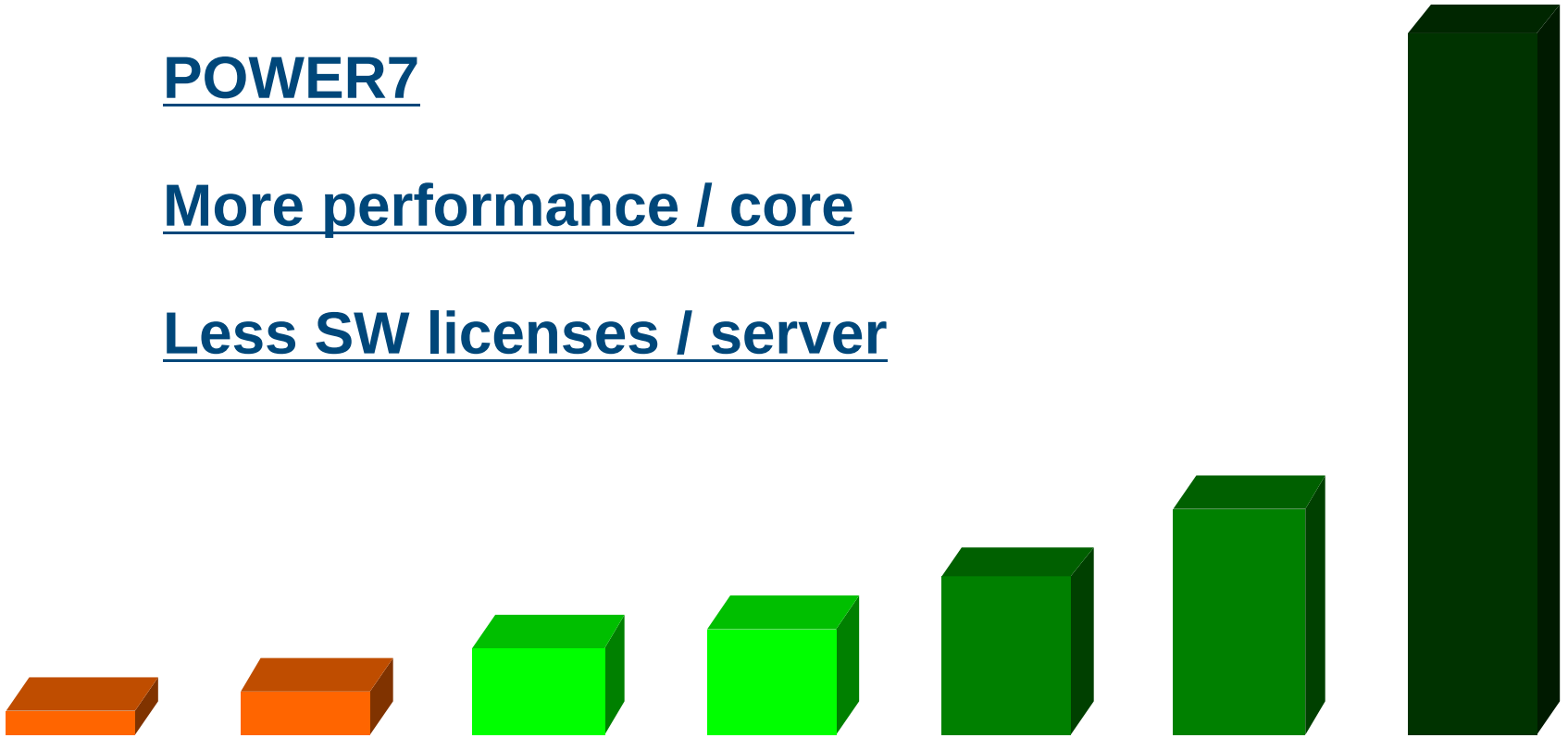
IBM is the leader in Processor and Server design

Power your planet.

POWER7

More performance / core

Less SW licenses / server



POWER4™	POWER4+™	POWER5™	POWER5+™	POWER6™	POWER6™	POWER7™
p670 1.1 GHz rPerf: 24.46	p670 1.5 GHz rPerf: 46.79	p5-570 1.65 GHz rPerf: 68.4	p570 1.9 GHz rPerf: 85.20	Power 570 4.7 GHz rPerf: 134.35	Power 570 4.2 GHz rPerf: 193.25	Power 780 3.8 GHz rPerf: 685.09

Power your planet.

Power your planet.