

**zEnterprise.**  
**A New Dimension in Computing**

# zEnterprise – Intro and Discussion points



# The idea of “one size fits all” is attractive

But, in reality is unachievable

While in theory, all workloads could run on a single platform...

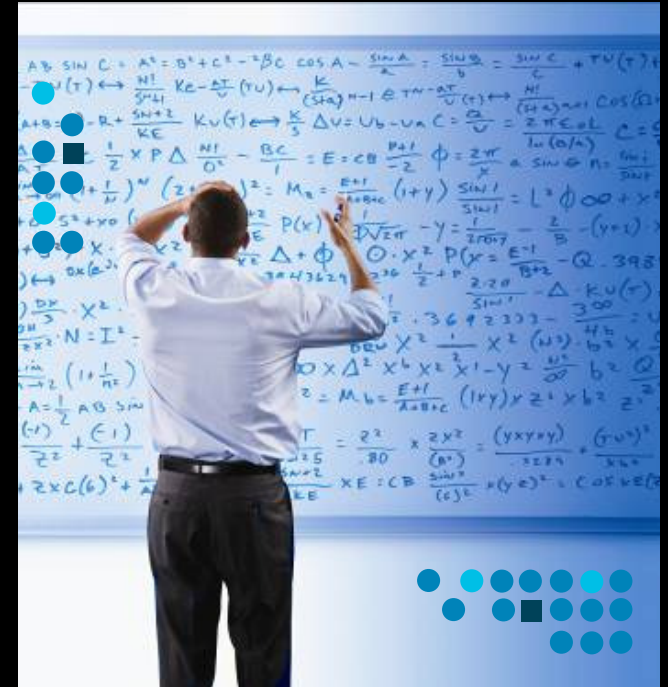
... in actual practice, multiple platforms provide a better solution for many workloads

You need the data serving strengths of the mainframe, the security, the resiliency, the scalability

You need the computational strength of power systems, for HPC and large scale application serving

You need the breadth of System x, for front end applications, special function servers and a myriad of niche applications

Creating a single platform infrastructure would be highly inefficient and ineffective and unsustainable in the long term.



## *A system of systems that unifies IT for predictable service delivery*

Unified management for a smarter system:  
**zEnterprise Unified Resource Manager**

- Part of the IBM System Director family, an integrated System z management facility responsible for zEnterprise platform management
- Unifies management of resources, extending System z qualities of service across the zEnterprise System

The world's fastest and most scalable enterprise system:  
**IBM zEnterprise 196**

Ideal for large scale data and transaction serving and mission critical applications

Most efficient platform for Large-scale Linux consolidation

Capable of massive scale up, over 50 Billion Instructions per Second (BIPS)

Scale out to trillion of instructions per second:  
**zEnterprise BladeCenter Extension (zBX)**

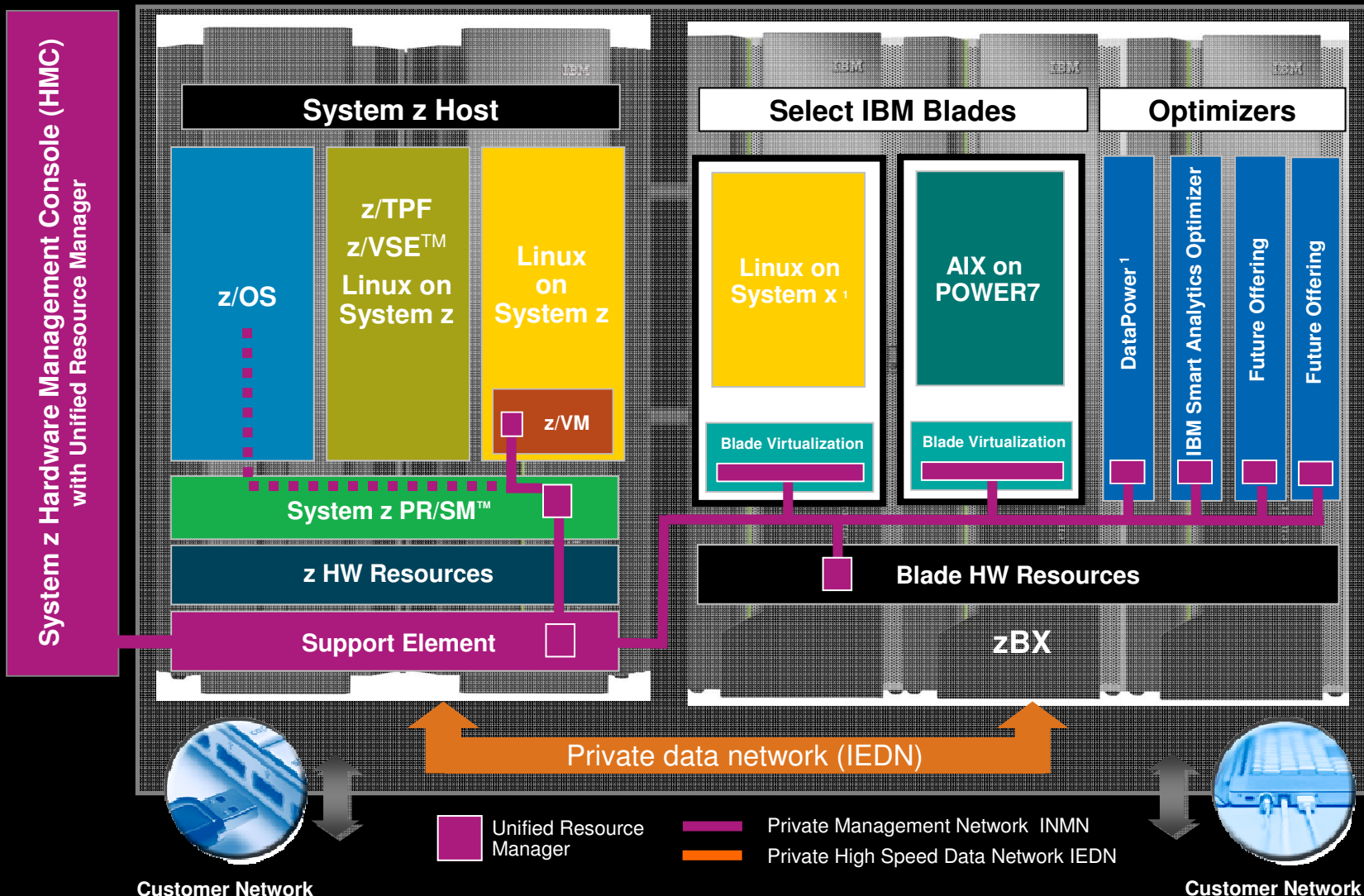
Selected IBM POWER7 blades and System x Blades\* for tens of thousands of AIX and Linux applications

High performance optimizers and appliances to accelerate time to insight and reduce cost

Dedicated high performance private network



# A look inside the IBM zEnterprise System





# Managing Diverse Workloads Across the Enterprise

## **Transaction Processing and Database**

- *Application Database*
- *Data Warehousing*
- *Online Transaction Processing*
- *Batch*

## **Analytics**

- *Data Mining Applications*
- *Numerical*
- *Enterprise Search*

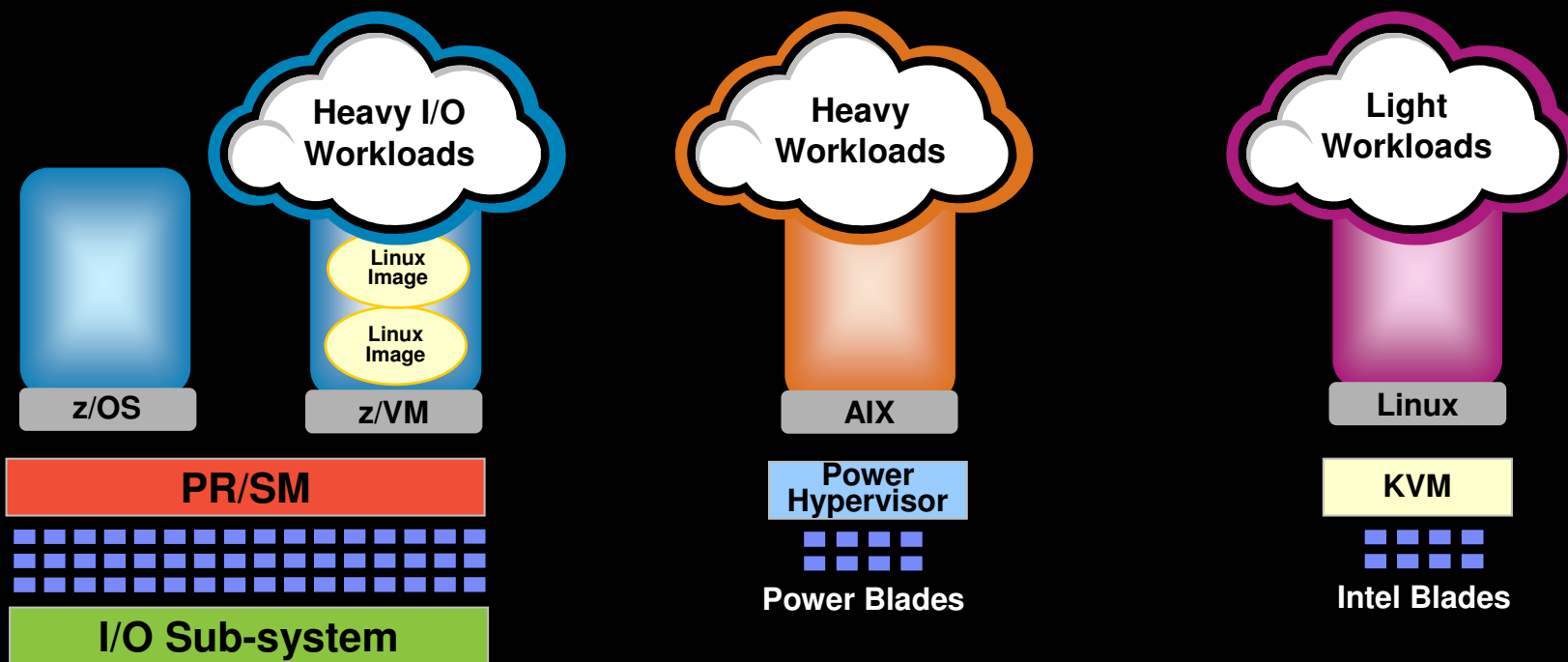
## **Business Applications**

- *Enterprise Resource Planning*
- *Customer Relationship Management*
- *Application Development*

## **Web, Collaboration and Infrastructure**

- *Systems Management*
- *Web Serving/Hosting*
- *Networking*
- *File and Print*

# zEnterprise Extends Cost Advantages to a Broader Range of Workloads



- Scale up to 80 cores in a frame (z/OS clusters with Sysplex)
- Dedicated I/O Sub System
- Superior qualities of service

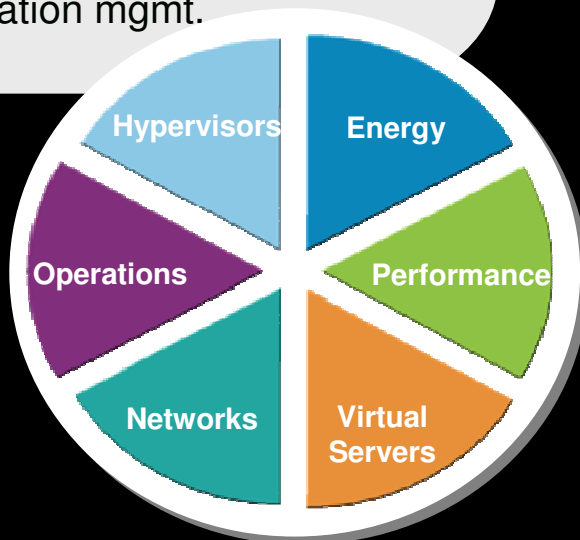
- Scales to 8 cores per blade
- Larger number of fast processing threads
- Floating point accelerators

- Scales to 8-12 cores per blade
- Fast processing threads
- Commodity I/O
- Modest qualities of service

# Extending zEnterprise Unified Resource Management with Integrated Service Management

## zEnterprise Unified Resource Management

- Workload-based resource allocation and provisioning for zEnterprise
- Physical & Virtual Resource Management
- Goal Oriented Management of zEnterprise resources (Availability, Performance, Energy, Security)
- Faster transaction processing with reduced network latency
- Operational Controls for Hardware/Firmware
- Service & Support for Hardware/Firmware
- Hardware configuration mgmt.



## Tivoli & Integrated Service Management

Visibility, Control and Automation for Applications, Transactions, Databases, all Datacenter Resources

- Integrated Operational Dashboards to monitor and manage service impacting events
- Key Performance Indicators (KPI) applied to Business Services for impact analysis
- Heterogeneous data in ONE
- Business Service Modeling for planning
- Contextual Correlation to reduce Mean time to repair (MTTR)
- Establish and automate service level agreement (SLA) tracking

## IBM Smart Analytics Optimizer

### *Capitalizing on the Best of Relational and Columnar Databases*

*Workload optimized, appliance-like, add-on, that enables the integration of business insights into operational processes to drive winning strategies.*

- **Performance:** unprecedented response times to enable 'train of thought' analyses frequently blocked by poor query performance
- **Integration:** connects to DB2 through deep integration providing transparency to all applications
- **Self-managed workloads:** queries are executed in the most efficient way
- **Transparency:** applications connected to DB2, are entirely unaware of ISAOPT
- **Simplified administration:** appliance-like hands-free operations, eliminating many database tuning tasks

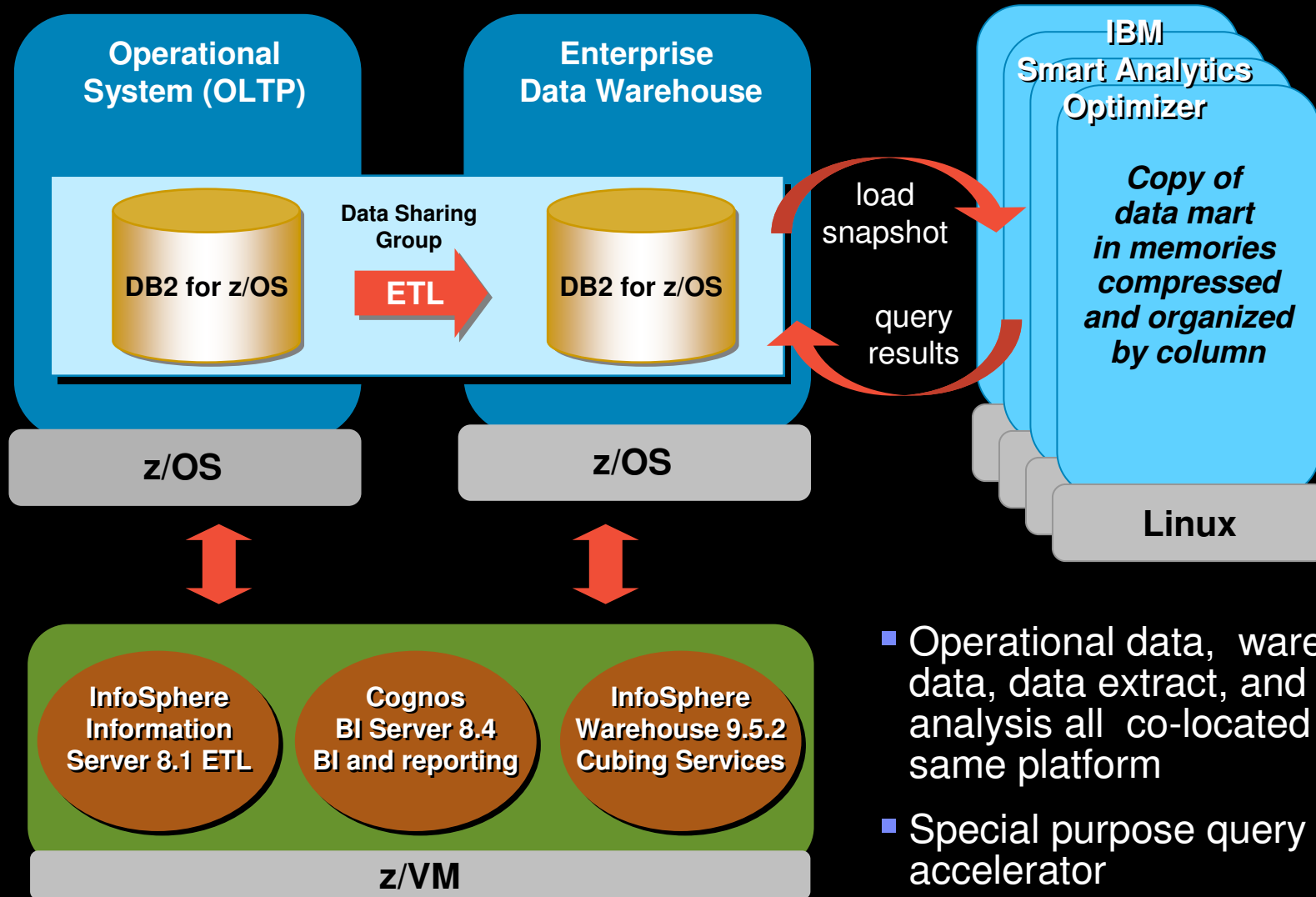


Up to **80X** faster\* than z10

*Breakthrough technology enabling new opportunities*

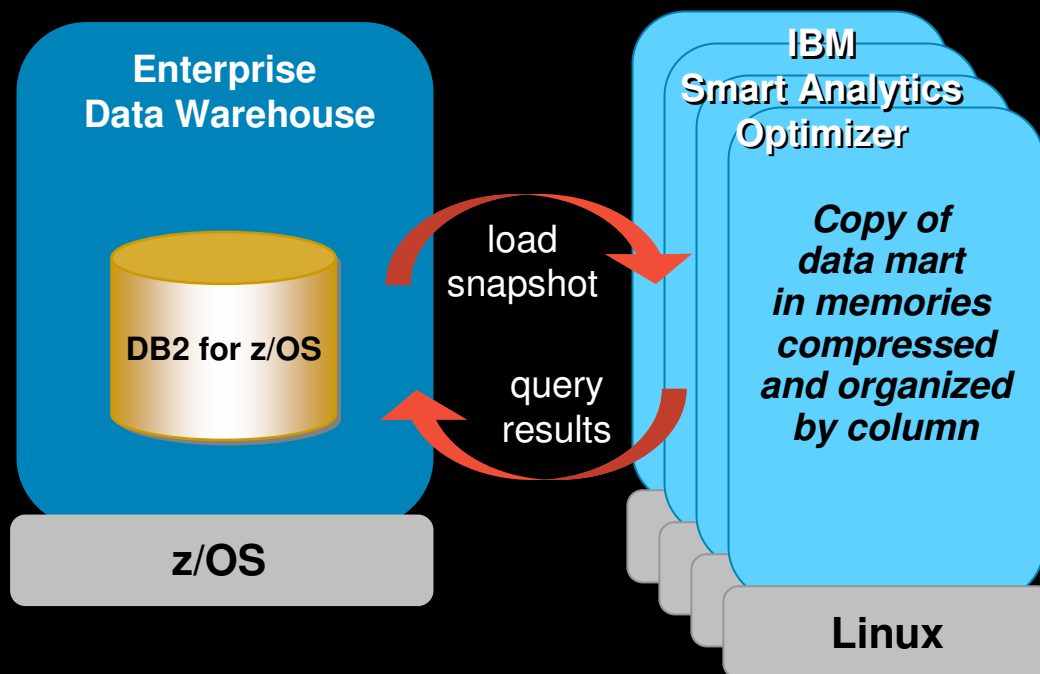


# Consolidate Complete Business Intelligence Solution on zEnterprise



- Operational data, warehouse data, data extract, and analysis all co-located on the same platform
- Special purpose query accelerator

## IBM Smart Analytics Optimizer (ISAOPT) Enables Near Real-time Analytics on zEnterprise

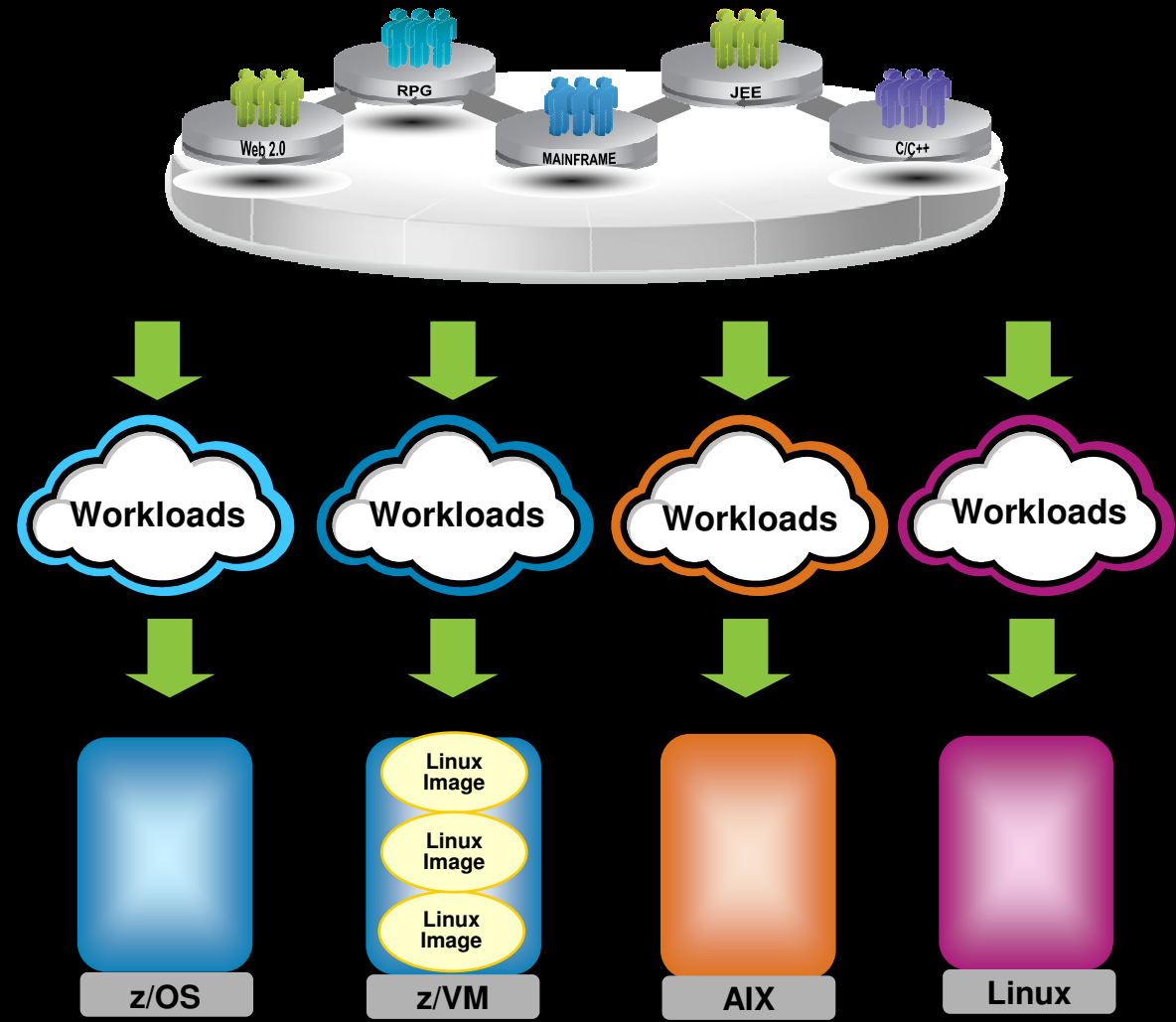


- IBM Smart Analytics Optimizer
- Leverages blade memory and processors for warehouse queries
- Load snapshot then execute queries

- Early customer results
  - Analysis jobs execute **3 - 171** times faster
  - Cost per job reduced by **1.4 - 1838** times in continuous use
  - Real time analytic performance **7 - 387** samples per day

Note: Based on results from 3 early customer studies

# Rational Delivers a Unified Development Tool Set for All zEnterprise Environments



- Unified edit, compile, debug
- Unified development processes
- Unified test
- *Improve development productivity by up to 20%\**



## Multi-platform Development and Deployment on zEnterprise Systems

- An integrated and collaborative software delivery platform
  - Improve developer productivity, team efficiency, skills transfer and speed delivery of traditional and modern workloads
- New rapid development and testing of z/OS applications with RDz UT, offering a more affordable development and test environment on x86 Linux
  - Frees up development MIPS for production capacity
- New zEnterprise compilers speed application performance by exploiting new zEnterprise hardware instructions with C/C++ and PL/I compilers
  - Faster performance for new and existing applications



**IBM Rational Enterprise Modernization solutions**



## The IBM zEnterprise System *Delivers Greater Simplification, Flexibility, and Value*

- The IBM zEnterprise™ 196 is the world's fastest and most scalable enterprise system\*
- Enables a mixed set of workloads to be deployed on best fit technologies
- Meets the need of today's heterogeneous data centers
- Reduces risk by extending the reach of System z Qualities of Service
- Improves service through tighter integration for multi-tier workloads
- Delivers lower acquisition and operating costs than a 'one-size-fits-all' approach

## TCA and TCO Fundamentals

- **Server cost is the smallest element for running commercial workloads**
  - Over a 3 - 5 year life, labor and energy costs are both higher than server cost
- **The greater the number of individual boxes, the greater the cost**
  - Each box must be managed – set up / operation / security / upgrade, etc.
  - Each box has to be fed by data
  - Each box requires telecommunications connections – routers / switches
  - Each box requires its cables and the cables of all of the connected boxes
- **Scale up versus scale out is no longer a primary issue**
  - All systems ... z, p, Intel ... support scale up and scale out
  - System z and Power Systems offer massive scale out inside the box
  - Cost is optimized through reducing the number of elements surrounding a server
- **Few businesses do granular cost accounting of their per server per system or per application**
  - Costs are often aggregated, then allocated
  - Most companies do not know their true cost of ownership
  - Historical charge back techniques almost always over allocate to large shared systems ... the mainframe

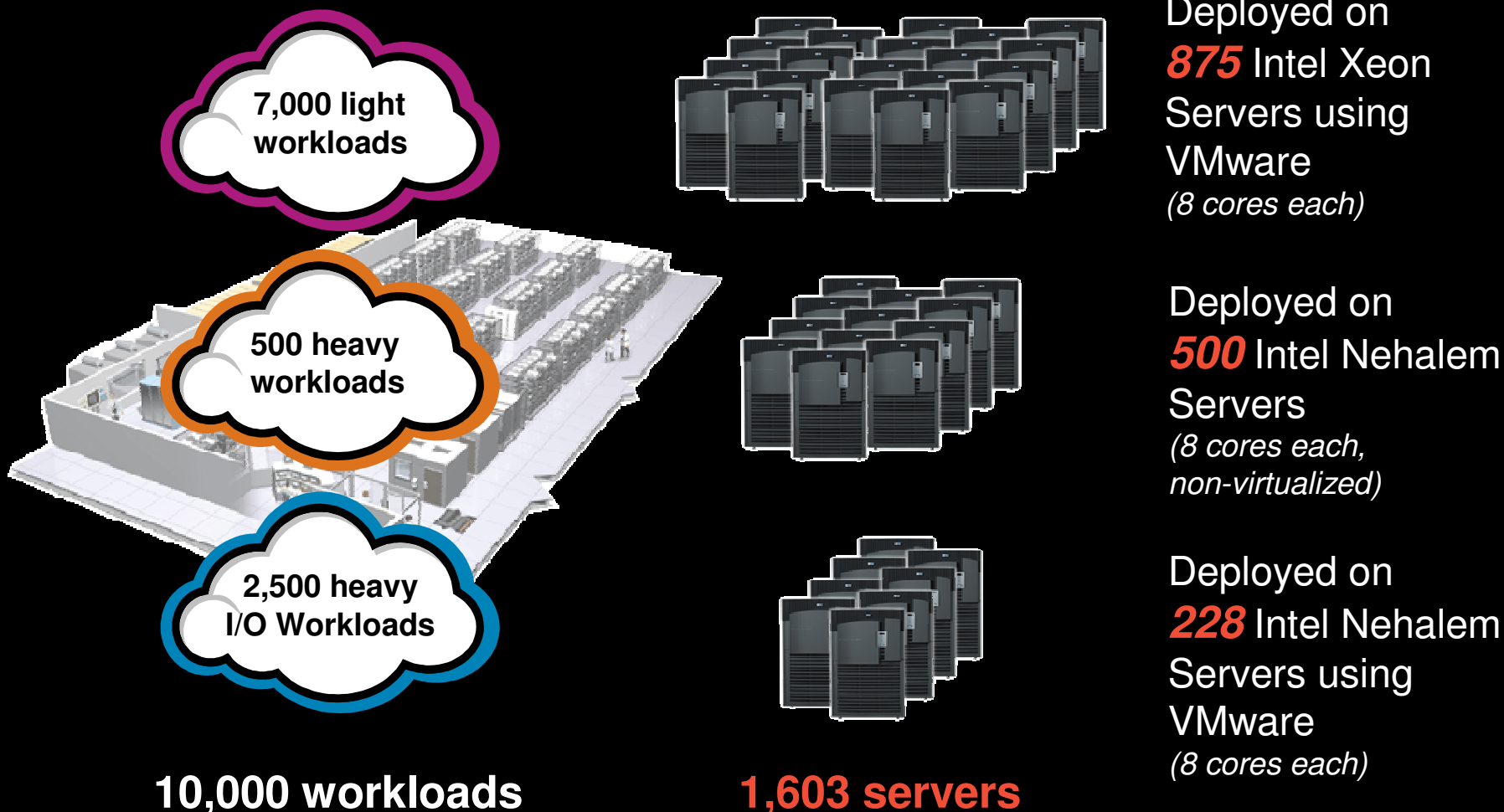
zEnterprise

## IBM Eagle Studies Demonstrate Most Mainframe Workloads are Already Best Fit

- A Total Cost of Ownership analysis study for customers
  - Cost and risk analysis of mainframe vs. alternative
  - Tailored to individual customer needs
    - Cost factors unique to each enterprise
    - Costs evaluated over five year period
  
- **48 of 50** IBM Eagle studies concluded that System z offered better TCO than a distributed alternative
  - Average cost of growing on System z was **41% less** than the distributed alternative

# Large Data Center

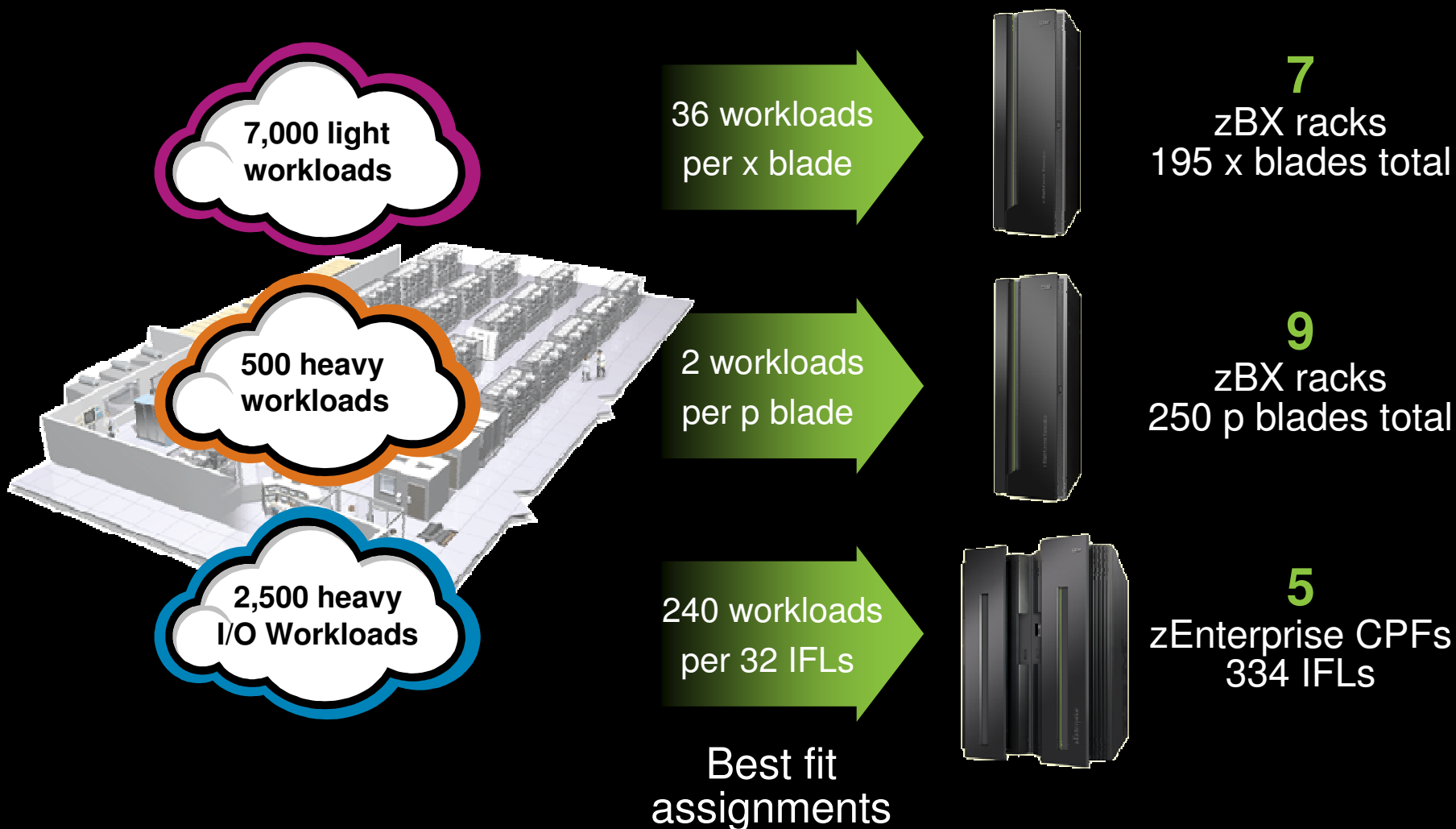
## What Did It Cost to Deploy 10,000 Workloads on Virtualized Intel Servers?



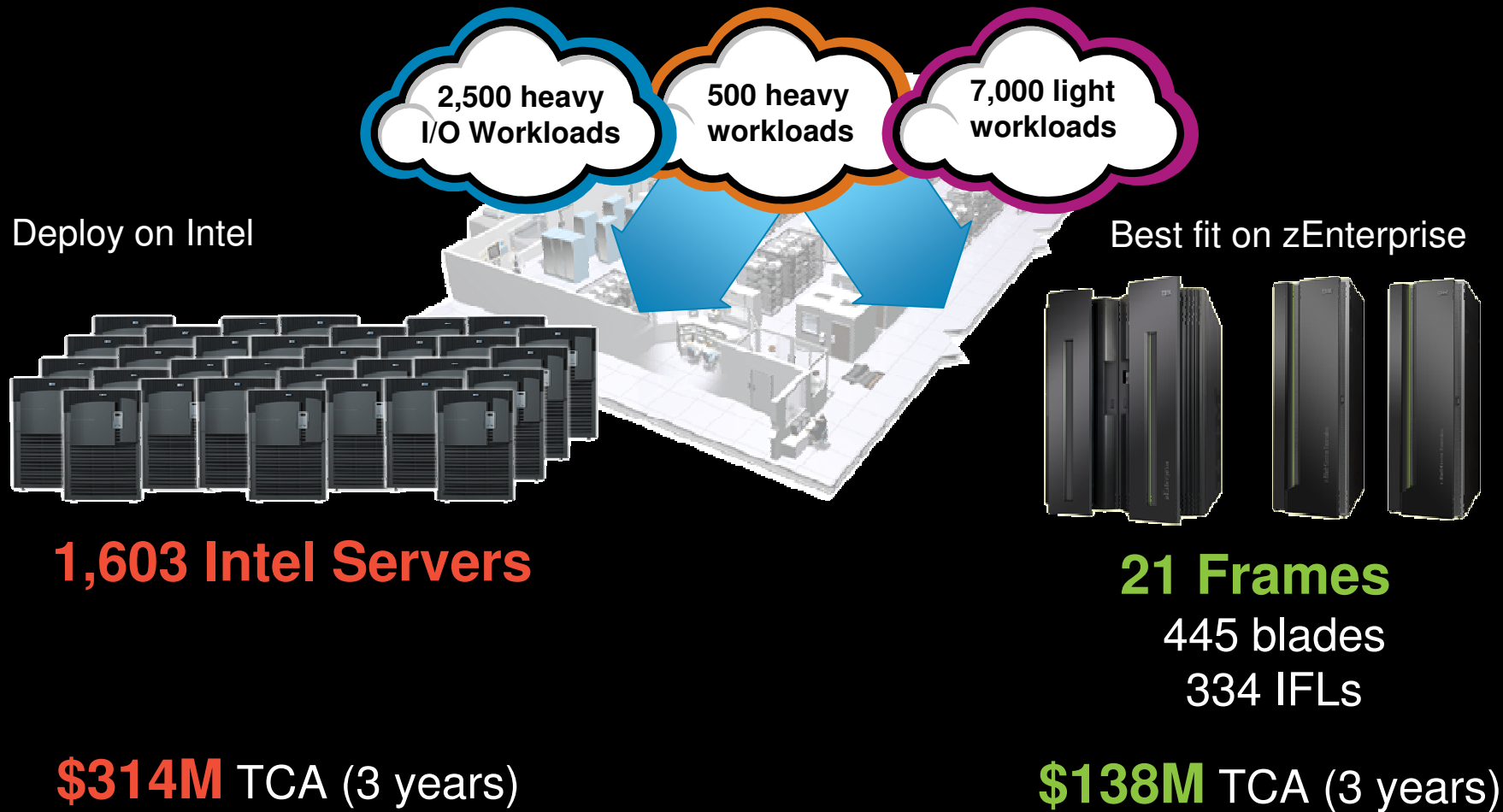


# Large Data Center

## What Does It Cost to Deploy 10,000 Workloads on zEnterprise?

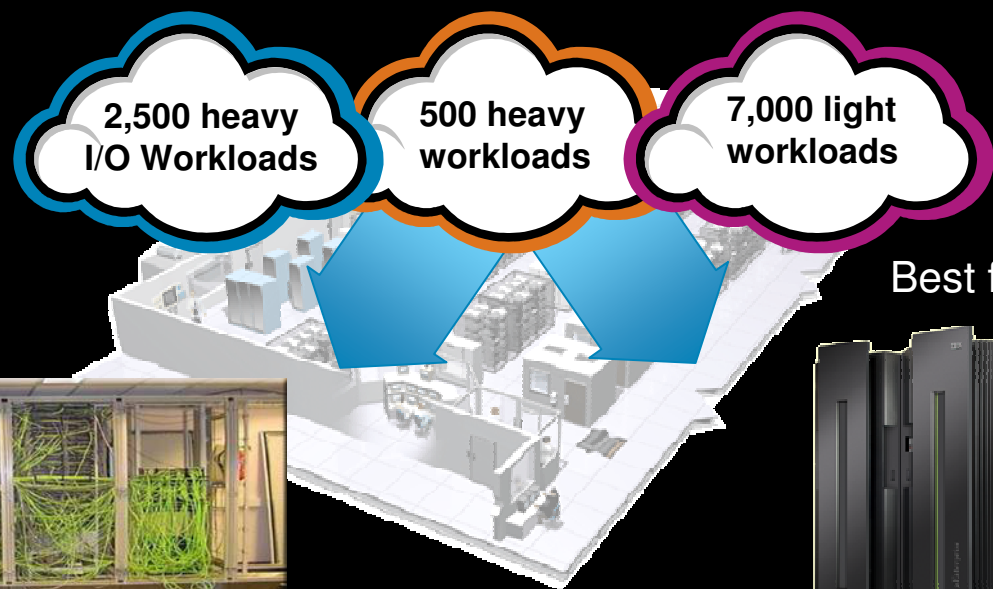


# Compare Server Cost of Acquisition



**56%**  
less

# Compare Network Cost of Acquisition



Deploy on Intel



## Additional network parts

313 switches    7,038 cables    6,412 adapters

**13,763** total network parts

**\$3.8M** TCA

Best fit on zEnterprise



## Additional network parts

7 switches    142 cables    74 adapters

**223** total network parts

**\$197K** TCA

**95%**  
less

# Compare Power Consumption



Deploy on Intel



**1,603 Servers**

**2,131 kW**

**\$5.6M**

3 years@ \$0.10 per kWh

Best fit on zEnterprise



**21 frames**

**419 kW**

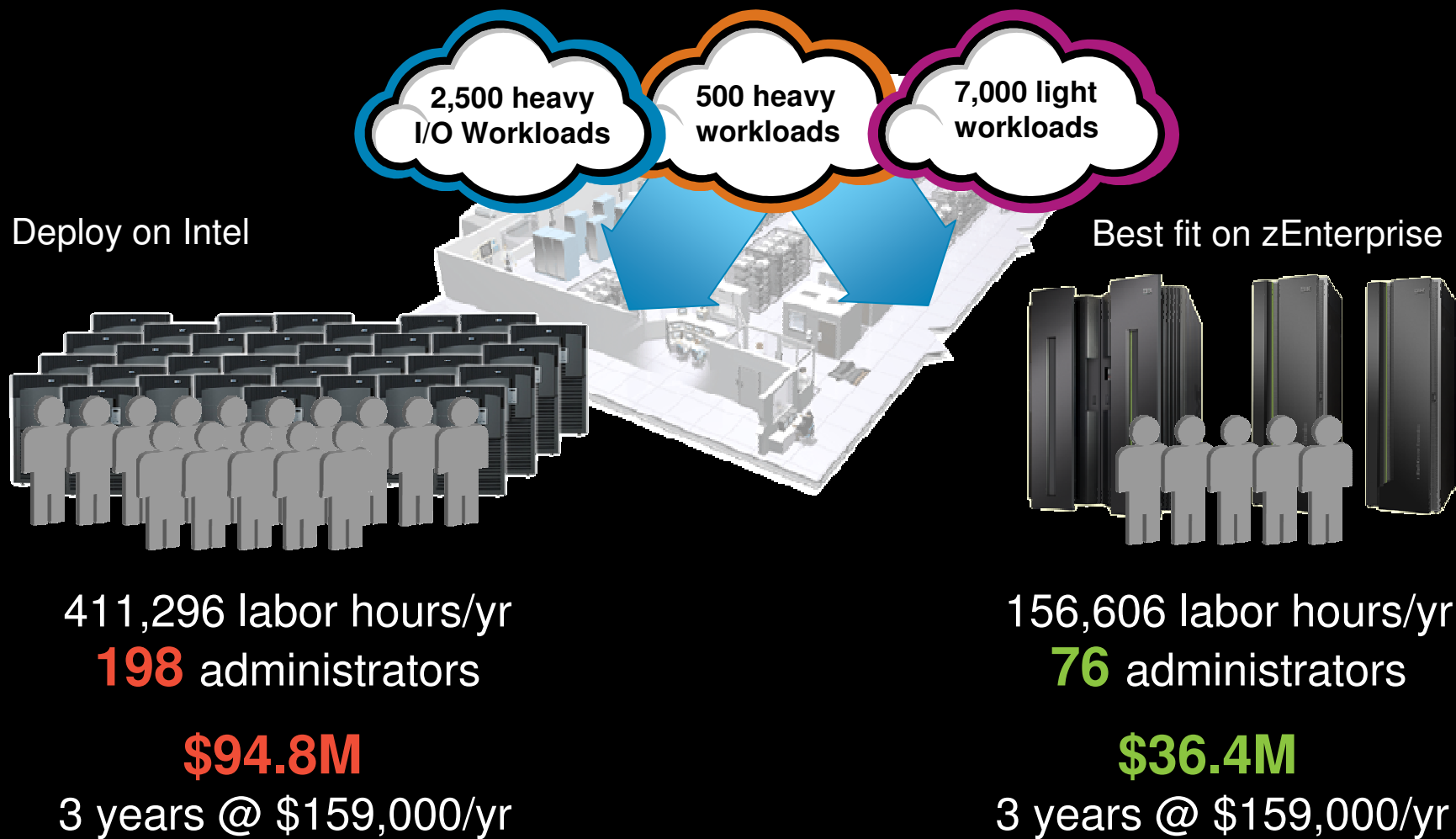
**\$1.1M**

3 years@ \$0.10 per kWh

**80%  
less**



# Compare Server Infrastructure Labor Costs



**62%**  
**less**

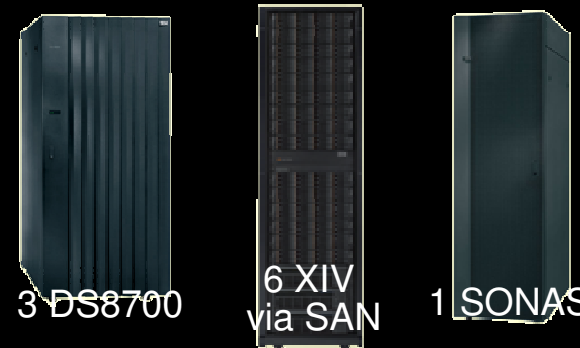
# Compare Storage Cost



Deploy on Intel



Best fit on zEnterprise



**7.7 PB** embedded storage  
 31% utilization  
 1,603 points of admin

**4.5 PB** provisioned storage  
 53% utilization  
 10 points of admin

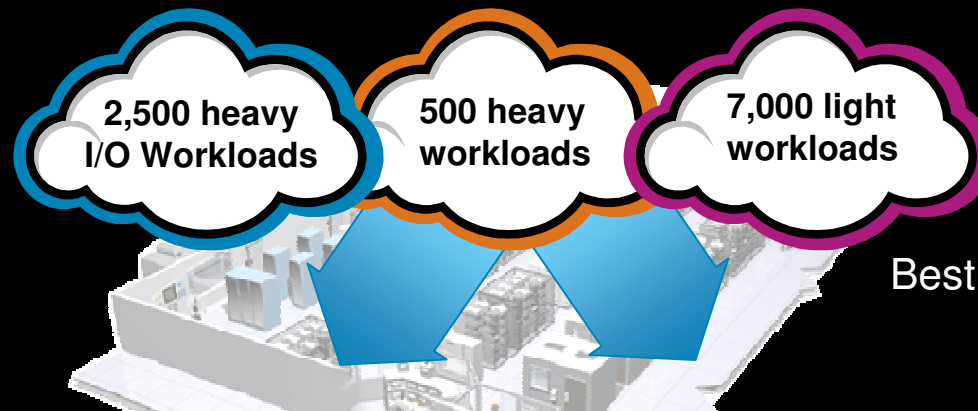
**\$211M** TCO(3 years)

**\$108M** TCO (3 years)

240GB active storage required per workload (2.4PB total)

**49%**  
 less

# Simplification – Fewer Parts to Assemble and Manage



Deploy on Intel

Best fit on zEnterprise

	<b>Servers</b>	
1,603		21 frames
13,763	<b>Network (parts)</b>	223
2,131	<b>Power (KW)</b>	419
198	<b>Administrators</b>	76
1,603	<b>Storage admin points</b>	10



# The Savings are Cumulative



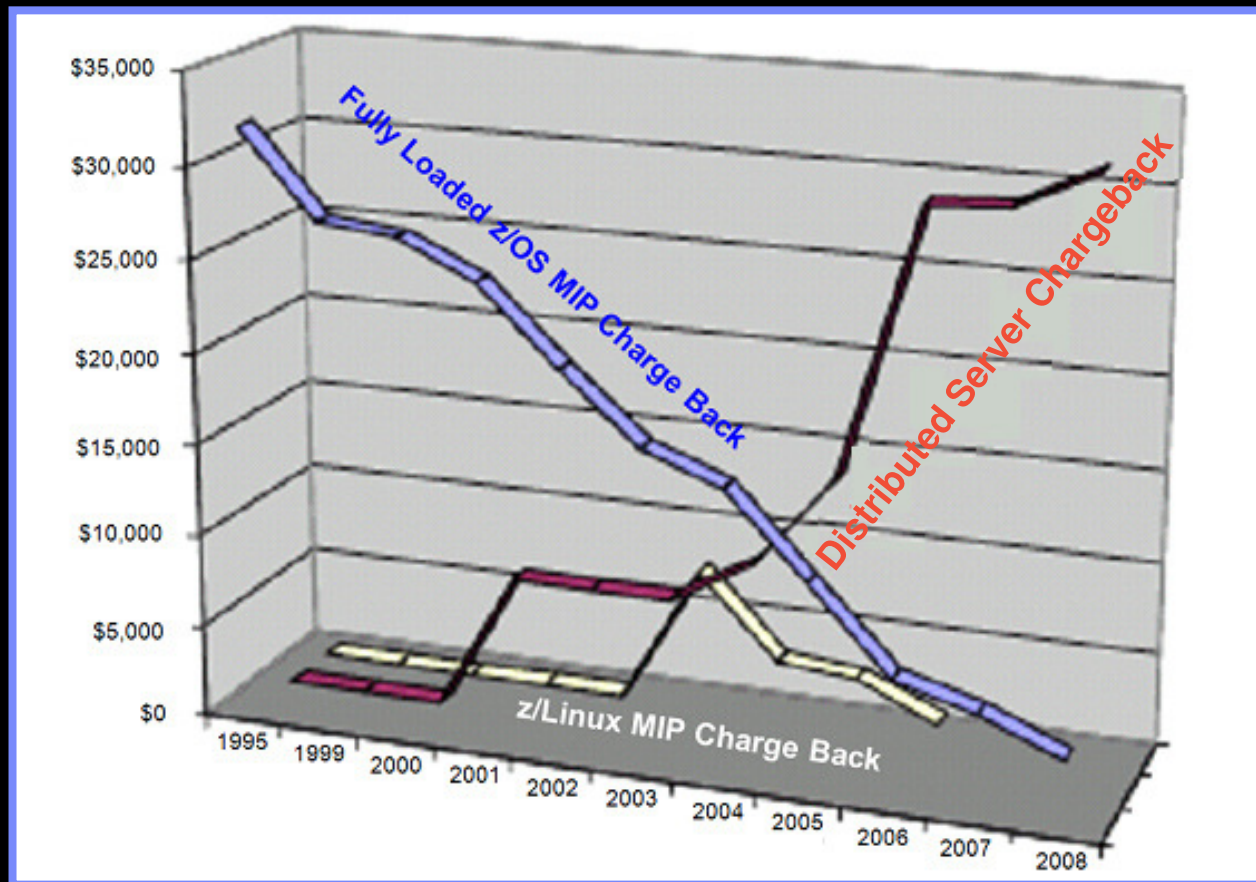
Three Year Cost of ...	Deploy on Intel	Best fit on zEnterprise
Servers	\$ 314M	\$ 138M
Network	\$ 3.8M	\$ 0.2M
Power	\$ 5.6M	\$ 1.1M
Labor	\$ 94.8M	\$ 36.4M
Storage	\$ 211M	\$ 108M
<b>Total</b>	<b>\$ 629M</b>	<b>\$ 284M</b>
<b>Total cost per workload</b>	<b>\$ 63K</b>	<b>\$ 28K</b>

**55%**  
less



# Accurate Charge Back Practices Can Reflect These Savings

*Internal Charge Back Practices Were Improved Over Time at a Large Financial Institution*



## Accurate Cost Allocations Show a True Picture of Costs and Aid Investment Decisions – An Example

- Best practice allocation should use *actual* distributed and mainframe costs
- In this example, the mainframe allocation decreased from 71% to 40%

	Typical Allocation – Management Estimates				Best Practice Allocation – Actual Costs			
	Distributed	%	MF	%	Distributed	%	MF	%
Power Cost	0	0	\$15,084	100	\$11,917	79	\$3,167	21
Labor Cost	0	0	\$350,000	100	\$210,000	60	\$140,000	40
Floor space	0	0	\$11,620	100	\$6,300	54	\$5,320	46
Software OTC depreciation	\$120,240	60	\$102,472	40	\$216,194	97	\$6518	3
Software S&S and MLC	\$168,783	50	\$168,783	50	\$181,242	54	\$156,325	46
Hardware OTC depreciation	\$103,691	25	\$311,074	75	\$184,435	44	\$230,330	56
Hardware Maintenance	\$20,276	25	\$60,829	75	\$37,151	46	\$43,953	54
Network	0	0	\$4,758	100	\$4,758	100	\$0	0
<b>Total</b>	<b>\$412,990</b>	<b>29</b>	<b>\$1,024,620</b>	<b>71</b>	<b>\$851,997</b>	<b>60</b>	<b>\$585,613</b>	<b>40</b>

## Thriving System z Ecosystem

### System z Linux: Fastest growing server platform



- Installed Linux MIPS growth of 43% CAGR (2004-2009)
- Shipped IFL MIPS increased 65% (YE07 to YE09)
- 70% of the top 100 System z clients are running zLinux
- Linux is 16% of the System z customer install base (MIPS)

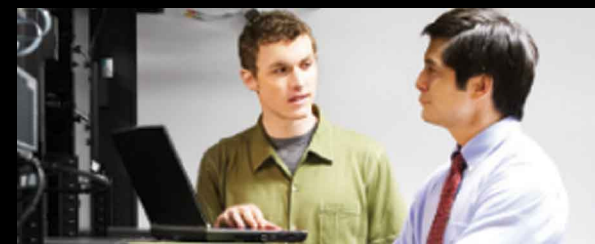
### Thousands of ISVs investing in System z platform



#### As of 1H2010:

- 1,650 unique ISVs have enabled more than 6,300 applications on the System z platform
- 3,000+ Linux applications are supported on System z:
  - 550 new Linux applications added in 2009; another 80 applications already enabled in 2010
- 4,000 applications are enabled on z/OS:
  - 2,000+ applications are enabled on z/OS 1.9 and later

### Worldwide adoption of mainframe curriculum



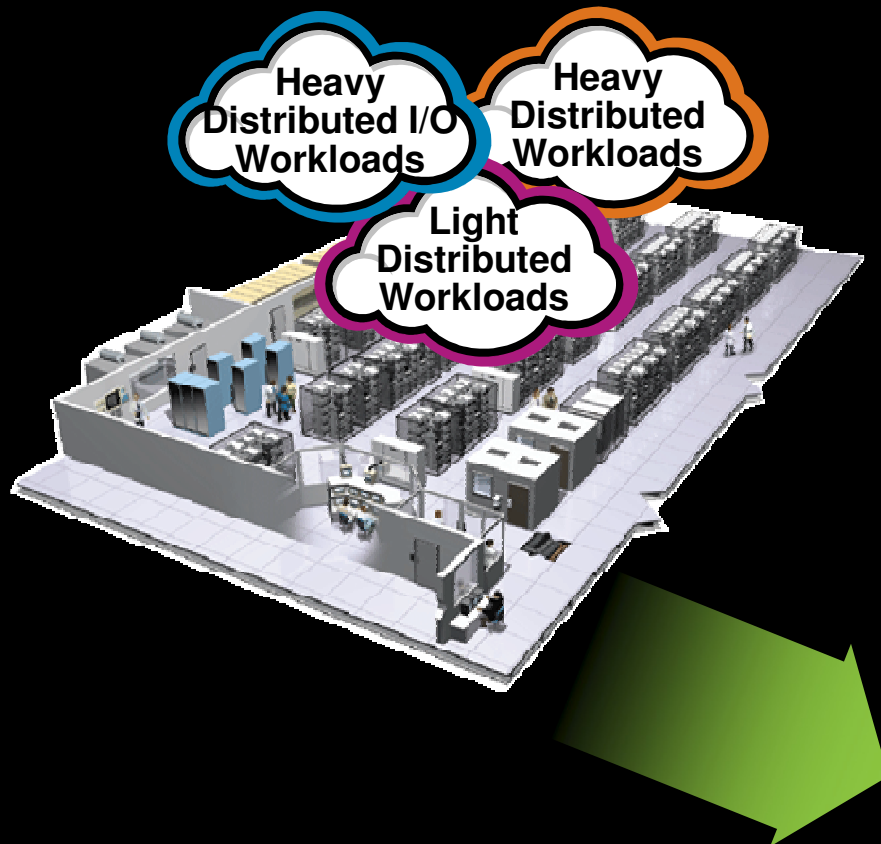
#### Students educated:

- Over 50,000 worldwide, 5,000 more students in China by 2010

#### University adoption:

- Over 600 schools enrolled globally
- 90% growth in 2 years; 2,000% since 2003; continued flow of schools adding curricula
- 50%+ outside of US

## zEnterprise is a Roadmap to the Data Center of the Future



- Lowest cost per unit of work for large scale workloads
- Revolutionary cost reductions for smaller scale workloads
- Data center simplification
- Improve quality of service
- ***No Other Platform Can Match!***

**Mainframe workloads  
+  
distributed workloads  
best fit for cost**

