Integrated Systems
The Value of Integrated Software and Hardware

Steve Mills
Senior Vice President and Group Executive, Software and Systems
2010 Roadmap Performance: **Total Software and Systems**

### Profit Performance
- Double-digit average annual growth
- Margin expansion of 8 points
- Contributed ~½ of IBM’s segment PTI growth

### Key Investments and Shifts
- Enhanced delivery capabilities and shifted technology investments toward higher growth areas, in support of 2015 game plan
  - Growth Markets
  - Integrated Systems
  - Cloud
  - Business Analytics & Optimization
  - Smarter Planet
  - Acquisitions
**2010 Roadmap Performance: Software Performance**

**Revenue**

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue</th>
<th>'00–'06 CGR</th>
<th>'06–'10 CGR</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>$12.6B</td>
<td>6%</td>
<td></td>
<td>$18.2B</td>
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<tr>
<td>2006</td>
<td>$18.2B</td>
<td></td>
<td>5%</td>
<td>$22.5B</td>
</tr>
<tr>
<td>2010</td>
<td></td>
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</table>

\[\text{Grew revenue 1.8X and profit 3.3X expanding pre-tax margin 15 points}\]

**Pre-Tax Income**

<table>
<thead>
<tr>
<th>Year</th>
<th>Pre-Tax Income</th>
<th>'00–'06 CGR</th>
<th>'06–'10 CGR</th>
<th>2010</th>
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<tbody>
<tr>
<td>2000</td>
<td>$2.8B</td>
<td>12%</td>
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<td>$5.5B</td>
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<td>2006</td>
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<td>13%</td>
<td>$9.1B</td>
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<td>2010</td>
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</tbody>
</table>

\[\text{9 points of PTI Margin expansion}\]

**A Decade of Growth**

- #1 Middleware Market Leader*
- Key Branded Middleware increased from 38% to 62% of Software revenues
- Acquired 70+ companies
- Increased number of development labs globally from 15 to 43

**2010 Roadmap Performance**

- Segment PTI 13% CGR to $9B in 2010
- 9 points of PTI Margin expansion
- Launched high growth initiatives
  - Smarter Planet solutions
  - Business Analytics & Optimization

**Note:**

- **Pre-Tax Income** includes 6 pts pre-tax margin expansion.
- **Revenue** includes revenue growth of + $5.6B and + $4.3B.
- **Pre-Tax Income** includes revenue growth of $2.8B, $5.5B, and $9.1B.

* Source: IBM Market Insights
2015 Roadmap: **Software Segment**

- Proven track record of profit growth
- Continued investments in high-growth areas
- Software positioned to contribute ~50% of IBM’s segment profit by 2015

**Operating Pre-tax Income**

- 2000: $2.6B
- 2006: $5.7B
- 2010: $9.5B
- 2015e: ~$17B

**Non GAAP View**

- Operating Leverage
- Strategic Acquisitions
- Base Revenue Growth

Software will Grow Operating Profit by $8B
Different Workloads Have Different Characteristics

**TRANSACTION PROCESSING AND DATABASE**
- Thousands of online users
- Large transactional databases
- 24x7 operation

**BUSINESS INTELLIGENCE AND ANALYTICS**
- Fewer users
- Complex queries
- Multiple data sources
- Large data warehouse

**BUSINESS PROCESS MANAGEMENT**
- Unite content, people and process flows
- Orchestrate multiple services
- Empower business users
Optimize Workloads

*Volume, Velocity and Variety of Information Drives the Requirements of Diverse Workloads*

- Understand workload characteristics
- Purpose built
- Workload optimized system design (hardware & software)
- Best fit approach
Optimized Systems

Optimized by Design
- IBM DB2 & WebSphere on IBM POWER System

Packaged Solutions
- IBM Smart Analytics System 7600
- IBM Netezza TwinFin

Appliances
- IBM WebSphere Datapower XC10 Appliance

Flexible

Focused

<table>
<thead>
<tr>
<th>Install Time</th>
<th>Days</th>
<th>Weeks</th>
<th>Days</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Technical Skills Required</td>
<td>Deep Product and Performance Tuning Knowledge</td>
<td>Basic Product Knowledge</td>
<td>Little or No Product Knowledge</td>
<td></td>
</tr>
</tbody>
</table>
Anatomy of an Optimized System: **Power7 Example**

- 2x transistor density
- 28% transistor speed
- 4x array density

45nm SOI Semiconductor Technology
Anatomy of an Optimized System: *Power7 Example*

- Balanced design: *Power, Speed, Cost*
- Integrated L3 cache
- Extensive RAS

- 45nm SOI Semiconductor Technology
- Power7 Microprocessor Design
- 4x cores, 8x threads
- 8x FLOPs/chip
- Up to 7x performance per chip in real applications
Anatomy of an Optimized System:  

- 99.997% uptime
- Designed for 90%+ utilization
- Modular, rack-opt and scalable systems
- High bandwidth memory
- Enterprise Reliability, Serviceability and Availability (RAS)

IBM Power 7 Family of Servers

45nm SOI Semiconductor Technology

Power7 Microprocessor Design

Power Systems Design

99.997% uptime
Designed for 90%+ utilization
Anatomy of an Optimized System: **Power7 Example**

- Hardware-based virtualization
- Memory expansion
- EnergyScale technology
- Dynamic thread and memory optimization
- Memory affinity

- +10 - 15% single thread boosted performance
- +10% on OLTP due to affinity option
- Up to 2x effective memory expansion
- 40 - 110% nominal frequency scaling
Anatomy of an Optimized System: Power7 Example

- Custom Power7 optimization
- Non-Uniform Memory Access (NUMA) aware memory management

- Up to +50% serial performance
- +10 - 15% OLTP and ERP
- +18 - 50% on HPC applications
- +15 - 25% on 64-bit Java
- 9 - 10x on RSA crypto
Anatomy of an Optimized System: **Power7 Example**

- Threading and memory management
- Clustered memory and lock management

**Results**
- IBM Power Systems have recorded more than 100 industry-leading performance benchmarks
- Average 5x throughput increase on 2x circuit density

---

- +85% WebSphere scale-up performance
- Up to 6x parallelism in WebSphere
- Protection keys enable fast and reliable user code
- DB2 pureScale scales out nearly linearly
IBM Smart Analytics System
Better Performance at Lower Cost

240%
More complex reports per hour

41%
More intermediate reports per hour

17%
Lower Total Cost of Acquisition (TCA)

Complex Reports per Hour 2TB
(Higher is better)

Immediate Reports per Hour 2TB
(Higher is better)

Cost – 3 year TCA System List Price

IBM Smart Analytics System 5600

Competitor
IBM Netezza TwinFin™ Data Warehouse Appliance
For Faster Installation and Operation

- Workload optimized for high performance analytics
- Deeply integrated hardware, software and storage to greatly simplify and accelerate deployment
- Appliance simplicity
- Focused appliance ideal for departmental data warehouse solutions and for satellite data marts
- Installs in hours
- Requires no tuning and minimal administration
- Petascale data capacity
Sprint estimates that it saved between 300 and 500 percent over the cost of a server-based software solution.

Within 24 hours we were up and running. I’m not exaggerating, it was that easy” … eHarmony IT executive

“… it’s a 1-hour process instead of two days.” … Dillard’s analyst

Enabled a shift for merchandisers from performing low-value activities, such as data gathering, to higher-value analysis of product placement, performance and customer preference

Boosts performance of its SAP ERP system by 20% and reduces database storage costs by 50% when Plansee migrated its SAP data to IBM DB2 for AIX running on IBM Power Systems

IBM DB2 on IBM Power System

IBM Smart Analytics System

IBM Netezza

WebSphere DataPower Integration Appliance XI50

IBM Investor Briefing
Smarter Computing …

Use of hardware and software technologies to increase operational efficiencies and optimize workload performance while reducing Total Cost of Ownership

Doing More for Less
Middleware
Transforming Computing

Robert LeBlanc
Senior Vice President, Middleware Software
IBM Delivers Software that Provides Clients the Capabilities Required to Transform Their Industries

IBM Software Capabilities

Connect & Collaborate  |  Business Integration & Optimization  |  Product & Service Innovation  |  Operations Effectiveness & Efficiency  |  Risk, Security & Compliance  |  Information into Insights

Delivered through our Middleware

Lotus. software  |  Rational. software  |  Tivoli. software  |  WebSphere. software  |  Information Management
IBM Software

Middleware Market Leader

Middleware Marketshare

#1 IBM

2000 $78B

2010 $127B

Continuing Growth & Investment

IBM Software Revenue

Profit more than tripled since 2000

$29B R&D, $20B+ Acquisitions

(2000-2010)

43 Labs, 35K Developers

20K+ Software Patents since 2000

17K Business Partner organizations

Systems Level Thinking

New Opportunities

Information Integration

“Big Data” analytics

Integrated optimized systems

Cloud Computing

© 2011 International Business Machines Corporation
Software-Enabled Cloud Computing

Virtualized Standardized Automated

End-to-end capabilities
- Collaborative business process design
- Real-time analytics
- Pre-configured workload patterns
- Automated application virtualization
- Automated Service Provisioning & Management
- Security across data centers
- Dynamic elasticity

Client Engagements
- >2K successful cloud engagements in 2010
- 50% of Fortune 10 and Fortune 50 working with IBM on private clouds
- >80% of Fortune 500 companies using IBM cloud capabilities
- Managing >1M virtual machines worldwide
- >18M SaaS users

Continuing Leadership
- Recognized as cloud computing leader by analysts
- 11 Cloud Labs worldwide
- >200 IBM researchers working on cloud security and privacy

Consulting and Implementation Services

Business Services

Platform

Infrastructure

Public Hybrid Private
Clients are Realizing the Value from Cloud Computing

Transforming the Data Center
By reducing 18 data centers to 3, achieved end-to-end lifecycle management, reduced cost and risk, and improved time-to-market

IBM Tivoli Service Automation Manager

Transforming Customers’ Business Models
AT&T Cloud platform supports network-resident applications and services
Integrated orchestration across IT and VPN provides business-class cloud services

IBM Cloud Service Provider Platform

Collaborative Business Process Design
90% reduction in customer complaints
Cost savings of $2.2M

IBM BPM BlueWorksLive

Connecting & Empowering People
120 hours per year, per employee productivity gains

Panasonic

IBM LotusLive
Turning Information Into Insights

Business Analytics & Optimization
- Business intelligence
- Advanced analytics
- Financial performance management

Information Integration & Governance

Database Software
- Structured information
  - $21B 2015 Opportunity
  - Growth: +2% CAGR

Content Management
- Unstructured information
  - $8B 2015 Opportunity
  - Growth: +6% CAGR

$28B 2015 Opportunity
Growth: +7% CAGR

$18B 2015 Opportunity
Growth: +8% CAGR

$21B 2015 Opportunity
Growth: +2% CAGR

$8B 2015 Opportunity
Growth: +6% CAGR

Business Momentum
- $14B in IBM Business Analytics & Optimization acquisitions since 2005
- 5K Information Server installations
- >38K professionals gained recognized skills across IM and BAO in 2010
- >1K Information Agenda client workshops (2009-2010)

Leadership
- Leader in 15 key analyst comparisons across IM, ECM and BAO
- Watson leverages DB2, Content Analytics and Information Integration capabilities

Competitive Edge
- >1K Oracle Database customers chose DB2 instead in 2010
- Netezza selected 84% of the time over competition based on Proof of Concept

Source: 1H11 Market Insights CAGR 2010-15
Clients are Turning Information into Insights

**Before**

- One of the biggest insurance companies in China
- Established 1996
- Life, pension, health
- 3.5M customers
- 120 branch offices

**Siloed Information**
- Disparate applications
- Many departments
- Information in different formats

**After**

- 10 employees
- Several weeks

**Single view of trusted data**
- 360-degree view of customers
- Real-time reporting
- New applications deployed faster
- First insurance company in China to achieve nationwide integration

- 1 employee
- Real time
IBM Investor Briefing

$10M-$20M Annual Savings from Cost Reduction, Fraud Prevention, New Revenue, Service Improvement

Real-time view of the business

Cognos
- Saved $7M in first year & more to come
- Real time instead of days for reporting

Single View of the Customer

InfoSphere
- Saved $11M in first year & more to come
- Eliminated 14K cases of double billing
- 600+ multiple customer instances
- 22K instances wrong service delivery to customer

Efficient Data Infrastructure

DB2
- $340K annual savings
- 12% lower environmental costs

Improved Customer Service

FileNet, DataCap
- $3M annual savings
- ~50% increase in productivity

Alameda County Social Services Agency

Oakland, California-based agency

Serves 1.5M citizens, handling 200k requests daily

Promoting the social and economic well-being of their citizens

Business Analytics & Optimization

Information Integration & Governance

Structured Information

Unstructured Information

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Software Solutions
Capturing the Growth

Mike Rhodin
Senior Vice President, Software Solutions
Business Analytics and Optimization

Business analytics is the key to enabling our clients to turn oceans of data into predictive models and actionable decisions.

Why analytics matters...

- **33% more Revenue Growth** - 12.5% vs. 9.4%
- **> 12x more Profit Growth** - 7.3% vs. 0.6%
- **32% more Return on Invested Capital** - 11.9% vs. 9.0%

$75B software opportunity in 2015

Source: IBM Global Business Services, The Global CFO Study 2010

© 2011 International Business Machines Corporation
Smarter Commerce

Smarter Commerce is a smarter way for companies to buy, sell, and market their products, by integrating operations and enhancing interactions through community, collaboration, process, and analytics - all within an industry context.

Why Smarter Commerce matters...

85% of CEOs want to gain more visibility into their businesses

57% of CEOs want to better understand customer needs

$20B commerce software opportunity in 2015

Source: 1H11 IBM Market Insights
Industry Solutions

Industry Solutions enable us to focus on making our clients successful in their own industries, and has allowed us to identify new opportunities, new buyers, and new markets.

Why Industry Solutions matter...

Memphis Police Department
Reduced city crime rate by 27% over 4 years

Infinity Property & Casualty Corporation
Achieved a 400% return in just three months

Sun World International
Decreased water usage by 8.5% since 2006, and reduced fuel usage by 20%

Growing almost 2X traditional middleware market

Source: 1H11 IBM Market Insights
New Markets, New Solution Spaces

$75B software opportunity

Business Analytics & Optimization

Business analytics is the key to enabling our clients to turn oceans of data into predictive models and actionable decisions.

$20B commerce software opportunity

Smarter Commerce

Smarter Commerce is a smarter way for companies to buy, sell, and market their products, by integrating operations and enhancing interactions through community, collaboration, process, and analytics - all within an industry context.

Growing almost 2X middleware market

Industry Solutions

Industry Solutions enable us to focus on making our clients successful in their own industries, and has allowed us to identify new opportunities, new buyers, and new markets.

Source: 1H11 IBM Market Insights
Systems and Technology
Continued Innovation

Rod Adkins
Senior Vice President, Systems and Technology Group
2010 Roadmap Performance: Systems and Technology

FY 2010 – Turnaround Year for STG
Revenue Trend 1Q09 to 4Q10 YTY

2010 Roadmap Performance Highlights

- IBM revenue share*:
  - System z: +2.6 pts since 2008; +5.9 pts in 2010
  - UNIX: +13.5 pts since 2006; +9.4 pts since 2008
  - x86: +2.1 pts since 2008
  - External disk: +.6 pt since 2008

- Improved competitiveness and enhanced business execution

*Sources: IDC WW Quarterly Server Tracker (02/28/11); IDC WW Quarterly Disk Storage Tracker (03/03/11)
2010 Highlights

Overall Strong Results: 11% Revenue Growth, 12% PTI Growth

System z
- Revenue grew 16%, MIPS grew 22%
- Gained 61 new accounts

Power Systems
- 5.1 pts revenue share gain*
- Nearly 1,200 competitive takeouts, generating almost $1B

Storage
- 975 new clients with XIV
- Continued to enhance data efficiency portfolio

System x
- Revenue grew 27%, 5th consecutive quarter of double-digit growth
- Expanded margin 3 pts

Microelectronics
- OEM revenue up 25% from networking, wireless communications, game consoles

Retail Store Solutions
- Revenue grew 22% extending leadership in point of sales

Systems Software
- Strong growth in virtualization and systems management

Systems Networking
- Strong core networking relationships
- Blade Network Technologies acquisition for data center integration

*Source: IDC WW Quarterly Server Tracker (02/28/11)
Our Systems Environment

New business requirements and economic pressures are driving the need for continued innovation and changes in the way:

- Workload optimized
- Fully virtualized

- Trusted and highly secure
- Efficiency and insights

- Pre-integrated
- Cloud

IT infrastructure has reached a new inflection point
Systems and Technology Group Strategy

INVEST
- Growth Markets
- Analytics
- Cloud
- Smarter Planet

TRANSFORM
- Go-To-Market
- Supply Chain Optimization

DELIVER
- Workload Optimized Systems
- Information Management
- Service Delivery

Smarter Computing

Deliver operating pre-tax income long-term growth model: 6% to 8%
## IBM’s Differentiation: Systems Stack Integration and Optimization

### Servers

<table>
<thead>
<tr>
<th>Applications</th>
<th>IBM Middleware</th>
<th>IBM Tivoli and Systems Director</th>
<th>Operating Systems</th>
<th>Hypervisors</th>
<th>IBM Server Architectures</th>
<th>Processors</th>
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### Storage

<table>
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<th>IBM Middleware</th>
<th>Tivoli Storage Manager</th>
<th>Operating Systems</th>
<th>Hypervisors</th>
<th>IBM System Storage</th>
<th>Storage Devices</th>
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<tr>
<td></td>
<td></td>
<td>and Systems Director</td>
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<td>Disk Systems</td>
<td>Disk Drives</td>
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<td>Tape Systems</td>
<td>Flash</td>
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<td>Tape</td>
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### Networking

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<th>IBM Tivoli and Systems Director</th>
<th>Operating Systems</th>
<th>Hypervisors</th>
<th>IBM System Network Infrastructure</th>
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</table>
# Our Sustained Investment Drives Technology Innovation and Systems Leadership

## Systems Investment
- **$3B annual investment in R&D for hardware design and systems software**
- Innovation and integration at every layer of systems stack – semiconductor technology thru application optimization

## Patent Leadership
- IBM: 18 years as U.S. patent leader with record 5,896 in 2010
  - Approximately 2,860 earned by STG for hardware design and systems software

## Strategic Acquisitions
- **XIV / Diligent**: Contributed to storage growth and market differentiation
- **Storwize / Blade Network Technologies**: New opportunities in data efficiency and systems networking

## Benchmarks*
- **Power7**: #1 SAP; #1 transactional processing/core; #1 Java; #1 High Performance Computing
- **System x**: #1 virtualization
- **Storage**: #1 throughput; #1 bandwidth

## Competitive Migrations
- Record 2,900+ competitive displacements to IBM servers and storage in 2010
  - More than 1,100 from Oracle/Sun and 750+ from HP

## Growth Markets
- Systems and Technology Group accounted for 27% of IBM Growth Markets revenue in 2010
  - Grew 20% YTY

* See Benchmark Footnotes page.
### 2011 Offerings Build on Momentum from 2010 Launches

**FIRST HALF**
- Real-time compression appliances
- DataPower for System z
- System x database blade, system networking
- Power7 High Performance Computing system
- Smart Analytics and Cloud updates
- Data Protection and Retention offerings

**SECOND HALF**
- System z Business Class, zEnterprise GA2
- XIV, SONAS updates
- System x solutions updates
- New flexible form factor for systems
- StorwizeV7000, DS8000, enterprise tape updates
- Systems Director updates for Power and System x

Data center efficiency redefined

- Systems architected to transform IT

---

Statements regarding IBM's future direction of product enhancements are subject to change or withdrawal without notice, and represent goals and objectives only.
In 2010, STG revenue was...

- **18% of IBM**
- **27% of Growth Markets**
- **53% of China**

Hardware establishes footprint in Growth Markets

- Hardware strategy to continue to deliver double-digit growth:
  - Expanding into new countries and cities that are focused on IT infrastructure development
  - Leading with high-end systems and in key industries
  - Investing in skills and ecosystem

Every dollar of Hardware revenue drives an incremental dollar of other IBM revenue

*Revenue mix percentages exclude divestitures (PCD, Printers)*
Senegal Ministry of Finance

Challenge
- Customs officers needed real-time access to country’s border checkpoints

Solution
- New System z10 Business Class solution to transform import and export processes

Benefits
- 70% better performance, 20% less power, 30% lower operating costs
2015 Roadmap: Systems and Technology Group

Operating Pre-Tax Income

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
<th>2010 actual</th>
<th>2011-2015</th>
<th>2015e</th>
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<tr>
<td>2009</td>
<td>$1.3B</td>
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<tr>
<td></td>
<td>$0.2B</td>
<td>~$0.6B</td>
<td>~$2B</td>
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</tbody>
</table>

- IT infrastructure has reached a new inflection point driving changes in the way:
  - Systems are designed
  - Data is analyzed and managed
  - IT is delivered and consumed

- Our sustained investments in innovation drive differentiation and economic value
  - Integration and deep optimization at every layer of systems stack

- STG gained momentum in 2010

- By 2015, expect 40% of STG’s revenue to be driven by Growth Markets

Operating pre-tax income long-term growth model: 6% to 8%
2015 Roadmap: Systems and Software

- Positioned to contribute over $19B of operating profit
- Continue investment and shift to higher-growth areas
  - Key Branded Middleware
  - Systems Growth Market Expansion
  - Continue Acquisition Strategy
- Differentiate through integration and optimization
  - Workload Optimized Systems
  - Integrated Server, Storage and Networking Stack
- Leverage leading Cloud capabilities
- Smarter Planet and Business Analytics & Optimization
Benchmark Footnotes

- IBM Power 795 on two-tier SAP SD standard application benchmark running SAP enhancement package 4 for the SAP ERP 6.0 application (Unicode): 32 processors / 256 cores / 1,024 threads, POWER7, 4.0 GHz, 4,096 GB memory, 126,063 SAP SD benchmark users, 0.98 seconds dialog response time, 96 percent CPU utilization running AIX® 7.1 and DB2® 9.7. Certification #2010046.

- IBM Power 780 cluster (3 x 64 core) (24 chips, 192 cores, 768 threads) with DB2 9.7 TPC-C result of 10,366,254 tpmC, $1.38/tpmC, configuration available 10/13/10

- IBM Power 780 SPECompL2001 result on a 64-core 3.86 GHz POWER7 (8 chips, 64 cores, 256 threads) of 1,797,211 (1,721,106 base).

- SPECvirt_sc2010 result for the IBM System x® 3850 X5 server of 5466 @ 336 VMs. 8 chips/64 cores/8 cores per chip), Red Hat Enterprise Linux® 6.0, and Kernel-based Virtual Machine (KVM) hypervisor.

- IBM DS8700 SPC-1 result of 380,489 IOPS ($18.83/IOPS over 97,581.66 GB ASU Capacity), mirroring in a 6-node SVC 5.1 cluster.

- IBM DS8800 SPC-2 result of 9,705.74 SPC-2 MBPS, price/performance of $270.38 at a ASU Capacity of 71,536.975 GB, RAID5.


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