Systems and Technology

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

**Segment PTI Growth Model 7% - 9%**
- 1 point of PTI margin expansion

**Performance Highlights**
- Continued systems leadership to gain revenue share and capture profit.
- IBM revenue share¹:
  - Servers: +9 pts. since 2000
  - UNIX: +21 pts. since 2000
  - x86: +2 pts. in 2009
  - External disk: +1 pt. in 2009
- Acquisition success
  - XIV: 480+ new clients since 2008
- UNIX displacement success
  - 745 competitive displacements since 1Q09, nearly 60% were Sun takeouts
- Improved competitiveness and enhanced business execution

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**FY2009 Share¹**

Server share gain/loss *in share points*

- IBM
- HP
- SUN

**External disk share gain/loss *in share points***

- IBM
- HP
- EMC

**Historical PTI performance²**

- 7.5% 9.6% 7.7% 8.3%
- $1.7 $2.2 $1.6 $1.4

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Sources: ¹IDC quarterly share trackers 2009; ²GAAP view
Momentum in IBM Growth Markets

- Growth markets contributed 28% of hardware revenue in 2009
  - Revenue expected to grow high single digits through 2015
Strength in BRIC Countries

- BRIC countries represented 14% of 2009 hardware revenue

Revenue for BRIC countries combined\(^1\)

\(^{1}\) Excludes PC and Printer Systems Divisions
Sustain Leadership with New Systems Portfolio

First Half 2010

- **POWER7**
  (midrange & blades)

- **System x eX5**
  (racks & blades)

- **Systems Storage**
  *(Scale out Network Attached Storage, flash, data de-duplication)*

- **Systems Software**
  *(management of heterogeneous virtualized environments)*

Second Half 2010

- **New System z**

  - **POWER7**
    *(high-end, entry)*

  - **System x eX5**
    *(high-end)*

  - **Systems Storage**
    *(XIV, DS8000 & midrange)*

  - **Systems Software**
    *(integrated management across server, storage & network)*
More Performance Per Core Than Any UNIX System

POWER7

4.6 to 7.5 times

more performance per core than HP Itanium and Sun Enterprise cluster respectively
POWER7: Superior Economic Value Over Nehalem

15 to 2
$244,860 less

Power 750 with PowerVM has $244,860 lower Oracle support and subscription cost over three years than consolidating to 15 new HP Nehalem-EP systems.

SAP on Oracle DB

HP Nehalem-EP

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Next System z Introduction: Second Half of 2010

- New ultra-fast and massively-scalable System z server
- Industry’s first integrated “System-of-Systems”
  - Highly virtualized, workload optimized, multi-architecture environment
  - Integrated IBM POWER7 blades
  - Integrated IBM x86 blades
  - Special-purpose IBM Analytic Optimizers
  - Unified Resource Management – advanced platform management firmware
- Extending industry-leading mainframe governance and qualities of service for workloads that go beyond boundaries of System z to multiple platform environment
Systems & Technology Will Help Deliver IBM’s 2015 Roadmap

IBM Roadmap to 2015

- **Base Revenue Growth**
  - Leverage IBM integration to capture new opportunities by industry and workload
- **Growth Initiatives**
  - Drive additional growth and share opportunities:
    - Workload optimized systems
    - Storage grow high single digits annually
    - Growth Markets grow high single digits
    - Products enabled for new delivery models
  - Expect to gain 4 points of revenue share in Servers and 6 points in Storage
- **Future Acquisitions**
- **Operating Leverage**
  - Continued leadership in innovation to capture profit
    - Stack integration and optimization
- **Portfolio Mix**
  - Leverage improved competitiveness and business execution
    - Cost/expense structure

Operating pre-tax income long-term growth model: 6% to 8%
A smarter planet requires real-time data analytics and security for unprecedented scale and complexity that IBM is uniquely positioned to help them solve.

**Data**
- Terabytes of structured online data
- Petabytes of unstructured data including real-time streams

**Transactions**
- Simple online transactions with back end processing
- Complex transactions integrated with real-time analytics

**Security**
- Online data security and intrusion detection
- Security analytics for intrusion prediction and prevention
Traditional Workloads are Changing

- Largest credit card processing company in Korea
  40M card holders, 3B transactions a year

- Migrated to mainframe in 2009 for secured transaction integrity and to handle future demands of workload
  IBM beat Sun / Oracle and incumbent HP

- Add demands for real-time fraud detection analytics and billions of mobile devices acting as credit cards
  Scale and complexity will increase exponentially

- Clients need to extract more value from data and lower cost per transaction by an order of magnitude
  Predict / prevent fraud and improve customer loyalty
New Workloads are Emerging

- Delivers electricity in Houston area to more than 2M customers

- Improve consumption insight by preparing for 15-minute interval reads on 2.4M smart meters

- Using Tivoli and WebSphere on BladeCenter. To handle scale and operational analytics for 85B meter reads and 8 terabytes of data annually

Migrating to Power Systems

- Use near real-time information – immediately detect outages and help customers adjust usage for rate benefits

Improve customer satisfaction and operational costs
IBM Provides Unique Value in the Data Center

<table>
<thead>
<tr>
<th>Servers</th>
<th>Storage</th>
<th>Networking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applications</td>
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<tr>
<td>IBM Middleware</td>
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<td>IBM Tivoli and Systems Director</td>
<td>Tivoli Storage Manager and Systems Director</td>
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<td>VM Control</td>
<td>Recovery</td>
<td>Network Control</td>
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<td>Energy Manager</td>
<td>HSM</td>
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<td>Operating Systems</td>
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<td>zVM, PowerVM</td>
<td>VMWare, KVM, Xen, Hyper-V</td>
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<td>IBM Server Architectures</td>
<td>IBM Systems Storage</td>
<td>IBM Server Network Infrastructure</td>
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<td>IBM Adapters and Integrated Switches</td>
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<td>IBMz, Power</td>
<td>Tape Systems</td>
<td>Industry Adapters and Integrated Switches</td>
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<td>Disk Drive</td>
<td>IBM Cluster Switches</td>
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<td>Tape</td>
<td>Industry Network Core Switches and Routers</td>
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<td>Network Processors</td>
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IBM Provides End to End Data Center Optimization

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<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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<td>z, PowerPC, eX5</td>
<td>IBMz, Power</td>
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<td>Network Processors</td>
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IBM’s Differentiation: Systems Stack Integration and Optimization

**Servers**
- IBM Middleware
- IBM Tivoli and Systems Director
  - VM Control
  - Energy Manager
- Operating Systems
  - zOS, zLinux, AIX, i
  - Linux, Windows
- Hypervisors
  - zVM, PowerVM
  - VMWare, KVM, Xen, Hyper-V
- IBM Server Architectures
  - z, PowerPC, eX5
- Processors
  - IBMz, Power
  - x86

**Storage**
- IBM Middleware
- IBM Tivoli Storage Manager and Systems Director
  - Recovery
  - HSM
  - Archive
- IBM Storage Virtualization
- IBM Systems Storage
  - Disk Systems
  - Tape Systems
- Processors
  - Disk Drive
  - Tape

**Networking**
- IBM Middleware
- IBM Tivoli and Systems Director
  - Network Control
  - VMControl
- Operating Systems
  - zOS, zLinux, AIX, i
  - Linux, Windows
- Hypervisors
  - zVM, PowerVM
  - VMWare, KVM, Xen, Hyper-V
  - VMWare, KVM, Xen, Hyper-V with Virtual Switch
- IBM Server Network Infrastructure
  - IBM Adapters and Integrated Switches
  - Industry Adapters and Integrated Switches
  - IBM Cluster Switches
  - Industry Network Core Switches and Routers
  - Network Processors
  - Industry Network ASICs and Processors

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IBM Aligned to Capture Data Center Opportunity

Optimize Workloads

- **Performance**
  - Integration and optimization
  - System accelerators
  - In memory and flash

- **Scaling**
  - Dynamically adjust capacity at sustained performance

Data Conditioning

- Analytics
- Encryption
- Compression
- De-duplication
- Archive

Manage the Data Center

- **Efficiency**
  - Asset utilization and energy management

- **Management**
  - Intelligent workload placement and mobility

Resiliency

- Availability across data center

Make the right Delivery Choices

Managed Services

- Managed Resiliency
- Server Managed Outsourcing

- Data Center
- End User Support

Cloud

- Storage
- Development and Test

Pre-integrated

- Smart Analytics System
- PureScale Application System

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Optimize Workloads for Lowest Operating Cost

**Transaction Processing and Data Base**
- 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
IBM Workload Optimized Systems

**System z**
Low capital and operating expense: energy, floor space, licensing and management

**Power Systems**
Highly scalable system delivering 5X performance and 7X power efficiency at a lower cost¹

**System x**
The 5th generation of Enterprise X-Architecture with unparalleled memory capacity²

**Systems Storage**
Extensive block, file and tape capabilities for smart movement and management of data

**Shared Leadership**

**Integrated Service Management**
- Consolidate resources, manage workloads and automate processes
- VMControl for cloud providing virtualization and heterogeneous platform management

**Systems Networking**
- Strong relationships to offer choice of core network switching products
- Differentiate with network access products, network management and services

**Technology Innovation**
- Technology Alliance for industry collaboration
- Advanced performance and efficiency with eDRAM, computational lithography and 3D integration

¹ In comparison to previous IBM systems. ² IBM eX5 systems offer the most amount of memory compared to previous generation System x servers and the competition’s current generation x86 servers, thanks to IBM innovation. Decoupling the memory from processors allows unique memory expansion with the external IBM MAX5 memory chassis.
POWER7 Expands Power Systems Opportunity

70% lower cost
For DB2 on IBM Power 780 than an Oracle/Sun cluster running TPC-C¹

100% better performance
Business analytic queries run up to 100% faster on Power 7 than on Nehalem⁴

73% better performance
Using single JVM of WebSphere on POWER7 versus competitive application server on Nehalem²

40% lower cost
Lotus Domino on POWER7 supporting 40,000 users versus Microsoft Exchange on Nehalem³

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1) See chart “Supplemental Information about benchmark data” for detail. 2) Source: IBM internal study. 3) Exchange on Nehalem configuration from HP’s sizing tool. HP sizer for Microsoft Exchange Server 2010 at http://h20338.www2.hp.com/ActiveAnswers/us/en/sizers/microsoft-exchange-server-2010.html. 4) Based on IBM internal study using similar configurations.
Improve Time to Value with Integrated Solutions

IBM pureScale Application System
Database plus web application serving SAP on IBM DB2 and Power Systems
Database plus SAP applications

IBM Smart Analytics System
Data warehouse plus analytics and business intelligence

IBM LotusLive
Cloud-based collaboration suite for file sharing, social networking, instant messaging

Transaction Processing and Database
Analytics
Business Applications
Web, Collaboration and Infrastructure
IBM Leadership Position in Systems

<table>
<thead>
<tr>
<th>Transaction Processing and Data Base</th>
<th>IBM Position:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue/Profit Opportunity</td>
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<tr>
<td>Revenue: $24B</td>
<td>#1</td>
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<tr>
<td>CAGR: 1%</td>
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<tr>
<td>Profit: $2.3B</td>
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</table>

<table>
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<tr>
<th>Analytics</th>
<th>IBM Position:</th>
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<tbody>
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<td>Revenue/Profit Opportunity</td>
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<tr>
<td>Revenue: $8B</td>
<td>#1</td>
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<tr>
<td>CAGR: 2%</td>
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<td>Profit: $0.6B</td>
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</table>

<table>
<thead>
<tr>
<th>Business Applications</th>
<th>IBM Position:</th>
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<tbody>
<tr>
<td>Revenue/Profit Opportunity</td>
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<tr>
<td>Revenue: $12B</td>
<td>#1</td>
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<tr>
<td>CAGR: 1%</td>
<td></td>
</tr>
<tr>
<td>Profit: $1.0B</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Web, Collaboration and Infrastructure</th>
<th>IBM Position:</th>
</tr>
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<tbody>
<tr>
<td>Revenue/Profit Opportunity</td>
<td></td>
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<tr>
<td>Revenue: $36B</td>
<td>#2</td>
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<tr>
<td>CAGR: 3%</td>
<td></td>
</tr>
<tr>
<td>Profit: $2.2B</td>
<td></td>
</tr>
</tbody>
</table>

Source: IBM’s ordinal positions from IDC’s 2009 Server Workload Multiclient Study and IDC’s 2009 Storage Workload Multiclient study. IBM achieved those rankings in both the server MCS and the storage MCS separately. Source of share revenue, CAGR and Profit: IBM Analysis. Share position based on 2008 IDC Workload Share %’s against 2009 IBM Global Market View (GMV) opportunity by workload.
The data center opportunity is being transformed
- Explosion of data
- Number of transaction
- Concerns about security

IBM is leading IT transformation
- Workload optimized systems
- Integrated service management
- New delivery models

IBM’s aligned and integrated approach provide the data center infrastructure for a smarter planet

Operating pre-tax income long-term growth model: 6% to 8%
Certain comments made in the presentation may be characterized as forward looking under the Private Securities Litigation Reform Act of 1995. Those statements involve a number of factors that could cause actual results to differ materially. Additional information concerning these factors is contained in the Company's filings with the SEC. Copies are available from the SEC, from the IBM web site, or from IBM Investor Relations. Any forward-looking statement made during this event or in these presentation materials speaks only as of the date on which it is made. The Company assumes no obligation to update or revise any forward-looking statements.

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Supplemental Benchmark Data Information

**TPC-C Benchmark Results**

<table>
<thead>
<tr>
<th>Company</th>
<th>System</th>
<th>tpmC</th>
<th>Price/tpmC</th>
<th>System Availability</th>
<th>Database</th>
<th>Operating System</th>
<th>Chips</th>
<th>Cores</th>
<th>Threads</th>
<th>Cluster</th>
<th>Technology</th>
<th>tpmC per core</th>
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<tbody>
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<td>Sun/Oracle</td>
<td>T5440</td>
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<td>Oracle 11g EE RAC</td>
<td>Solaris 10</td>
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<td>UltraSPARC T2+</td>
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<td>HP</td>
<td>Integrity Superserver</td>
<td>4,092,799</td>
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<td>8/6/2007</td>
<td>Oracle 10g HP-UX 11i v3</td>
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<td>256</td>
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<td>Itanium2</td>
<td>31,975</td>
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<td>IBM</td>
<td>System p5 570</td>
<td>1,025,169</td>
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**SAP SD 2-tier Benchmark Results**

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<th>System</th>
<th>Benchmark Users</th>
<th>SAPS</th>
<th>OS</th>
<th>DB Version</th>
<th>SAP version</th>
<th>Cores / processor</th>
<th>chips / threads</th>
<th>Certificate Number</th>
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</thead>
<tbody>
<tr>
<td>IBM Power 750 Express</td>
<td>15600</td>
<td>85220</td>
<td>AIX 6.1</td>
<td>DB2 9.7</td>
<td>SAP enhancement package 4 for SAP ERP 6.0</td>
<td>32 / 4 / 128</td>
<td>2010004</td>
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</table>

This data is used to calculate relative SAPS. It is not intended to be used to project any possible benchmark results that were not actually executed.

(1) Ratio of Power 750 to DL380 G6 = 85222/18030 = 4.7 to 1; (2) Ratio of DL380 G5 to DL380 G6 = 12600/25000 = .504 to 1; (3) Therefore ratio of Power 750 to DL380 G5 = 4.7/.504 = 9.3 to 1


The virtualized system count and energy savings were derived from several factors: A performance factor of 7.88 was determined by SAP TPC 2-tier SD benchmark results for the Power 750, the and the DL380 G6 and the DL380 G5 for using the DL380 G6 as a bridge since it has results with both the old and new SAP benchmark kits and reducing the ratio based on rPerf ratio of 32-core Power 750 with 3.0GHz processor to 32-core Power 750 with 3.55GHz processor. The benchmark reviewed were current as of April 8, 2010. The benchmark detail is shown on the chart SAP Detailed Benchmark Performance. A virtualized utilization factor of 80% was assumed for the Power 750 Express and a non-virtualized utilization factor of 15% was assumed for the HP ProLiant DL380 G5. Power consumption figures of 1950 W for the IBM Power 750 Express and 1186 W for the DL380 G5 and 1348 W for the DL380 G6 were based on the maximum rates published by IBM and HP respectively. The data for the HP DL380 G5 came from the HP ProLiant DL380 G5 QuickSpecs available at [http://h18004.www1.hp.com/products/quickspecs/12477_na/12477_na.html#Overview](http://h18004.www1.hp.com/products/quickspecs/12477_na/12477_na.html#Overview) as April 8, 2010. The data for the DL380 G6 came from the HP ProLiant DL380 G6 QuickSpecs available at [http://h18004.www1.hp.com/products/quickspecs/13234_na/13234_na.html#Power%20Specifications](http://h18004.www1.hp.com/products/quickspecs/13234_na/13234_na.html#Power%20Specifications) as of April 8, 2010. Energy cost based on a Power Usage Effectiveness of 2.0 (representing an efficient datacenter). Energy cost of $.1021 per kWh is based on 2009 YTD US Average Retail price to commercial customers per US DOE at [http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html](http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html) as of April 8, 2010. The reduction, if any, in floor space, power, cooling and software costs depends on the specific customer, environment, application requirements, and the consolidation potential. Actual numbers of virtualized systems supported will depend on workload levels for each replaced system. The Oracle DB Software and Subscriptions savings based on .5 licenses per core for the DL380 G5 and 1 license per core for the Power 750. The DL380 G5 & DL380 G6 DB configurations included Oracle RAC and Partitioning since multiple systems were required for the DB portion of the workload. Oracle list prices from the Oracle Store available through [www.oracle.com](http://www.oracle.com). Prices are current as of April 8, 2010.

TPC-C and TPC-H are trademarks of the Transaction Performance Processing Council (TPPC). The IBM benchmarks results shown herein were derived using particular, well configured, development-level and generally-available computer systems.

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