# Principled Technologies®

# Comparative performance test
# Red Hat Enterprise Linux 5.1
# and
# Red Hat Enterprise Linux 3 AS
# on Intel-based servers

# Agenda

- **Overview**
- **System configurations**
- **Methodology overview**
- **The benchmarks**
  - Linpack
    - Basics
    - Test results
    - Key findings
  - SPECint_rate_base2006
    - Basics
    - Test results
    - Key findings
  - SPECjbb2005
    - Basics
    - Test results
    - Key findings

# Overview

**Intel and Red Hat commissioned Principled Technologies to compare the performance of three system configurations:**

- Red Hat Enterprise Linux AS 3 server on a Dual-Core Intel Xeon processor 7140M-based server
- Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server
- Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server

**We used the following three benchmarks:**

- Linpack
- SPECint_rate_base2006
- SPECjbb2005

# System configurations

| Server | Red Hat Enterprise Linux AS 3 server: Dual-Core Intel Xeon processor 7140M-based server | Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server: Quad-Core Intel Xeon processor X7350-based server | Red Hat Enterprise Linux 5.1 server: Quad-Core Intel Xeon processor X7350-based server |
|---|---|---|---|
| Processor frequency (GHz) | 3.4 GHz | 2.93 GHz | 2.93 GHz |
| Front-side bus frequency (MHz) | 800 MHz | 1,066 MHz | 1,066 MHz |
| Number of processor packages | 4 | 4 | 4 |
| Number of cores per processor package | 2 | 4 | 4 |
| Number of hardware threads per core | 2 | 1 | 1 |
| Motherboard | Intel SR4850HW4 | Intel S7000FC4UR | Intel S7000FC4UR |
| Chipset | Intel SE8501 | Intel ID3600 | Intel ID3600 |
| RAM for Linpack, SPECjbb2005, WebBench (16 GB in each) | 16 GB (16 x 1GB) PC2-5300 DDR2 (running at 400MHz) | 16 GB (16 x 1GB) PC2-5300 FB-DDR2 | 16 GB (16 x 1GB) PC2-5300 FB-DDR2 |
| RAM for SPECint_rate_base2006 | 32 GB (16 x 2GB) PC2-3200 DDR2 | 32 GB (16 x 2GB) PC2-5300 FB-DDR2 | 32 GB (16 x 2GB) PC2-5300 FB-DDR2 |
| Hard drive | Seagate ST3146854LC | Seagate ST973401SS | Seagate ST973401SS |

# Methodology overview

**After server setup, we performed the following steps to execute each benchmark:**

- Reboot system
- Wait for 5 minutes before beginning run
- Run the benchmark with the appropriate settings
- Record results

# Linpack: Basics

**About the benchmark**
- Measures a system's floating-point performance as it solves linear equations
- Reports results in billions of floating point operations per second, or Gflops/s
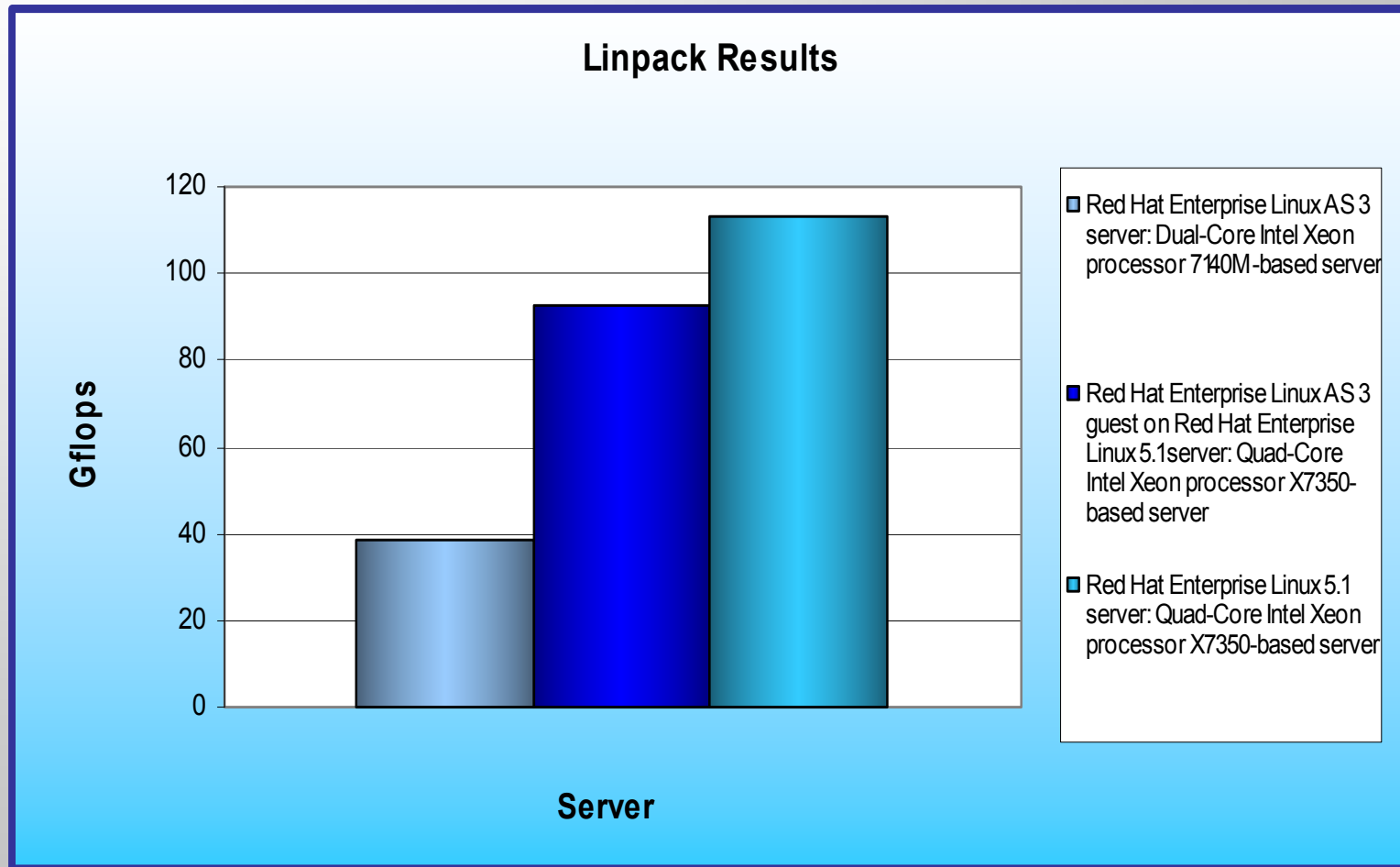
**Software components we used**
- MVAPICH2-0.9.8p3
- GotoBLAS 1.12
- HPL

**Compilers we used**
- GCC version 3.2.3 20030502 (RHEL3 and RHEL3 guest)
- GCC version 4.1.2 20070626 (RHEL5)
- binutils-2.14.90.0.4 (RHEL3)
- binutils-2.17.50.0.6 (RHEL5 and RHEL3 guest)

# Linpack test results

**Linpack Results**



Legend:
- Red Hat Enterprise Linux AS 3 server: Dual-Core Intel Xeon processor 7140M-based server
- Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server: Quad-Core Intel Xeon processor X7350-based server
- Red Hat Enterprise Linux 5.1 server: Quad-Core Intel Xeon processor X7350-based server

Y-axis: Gflops (0, 20, 40, 60, 80, 100, 120)
X-axis: Server

# Linpack key findings

- Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server delivered 193.1 percent more performance than Red Hat Enterprise Linux AS 3 server on a Dual-Core Intel Xeon processor 7140M-based server.
- Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server delivered a 139.6 percent performance increase over Red Hat Enterprise Linux AS 3 server on a Dual-Core Intel Xeon processor 7140M-based server.
- Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server achieved 81.8 percent of the performance of RHEL5.1 running native on the same server.
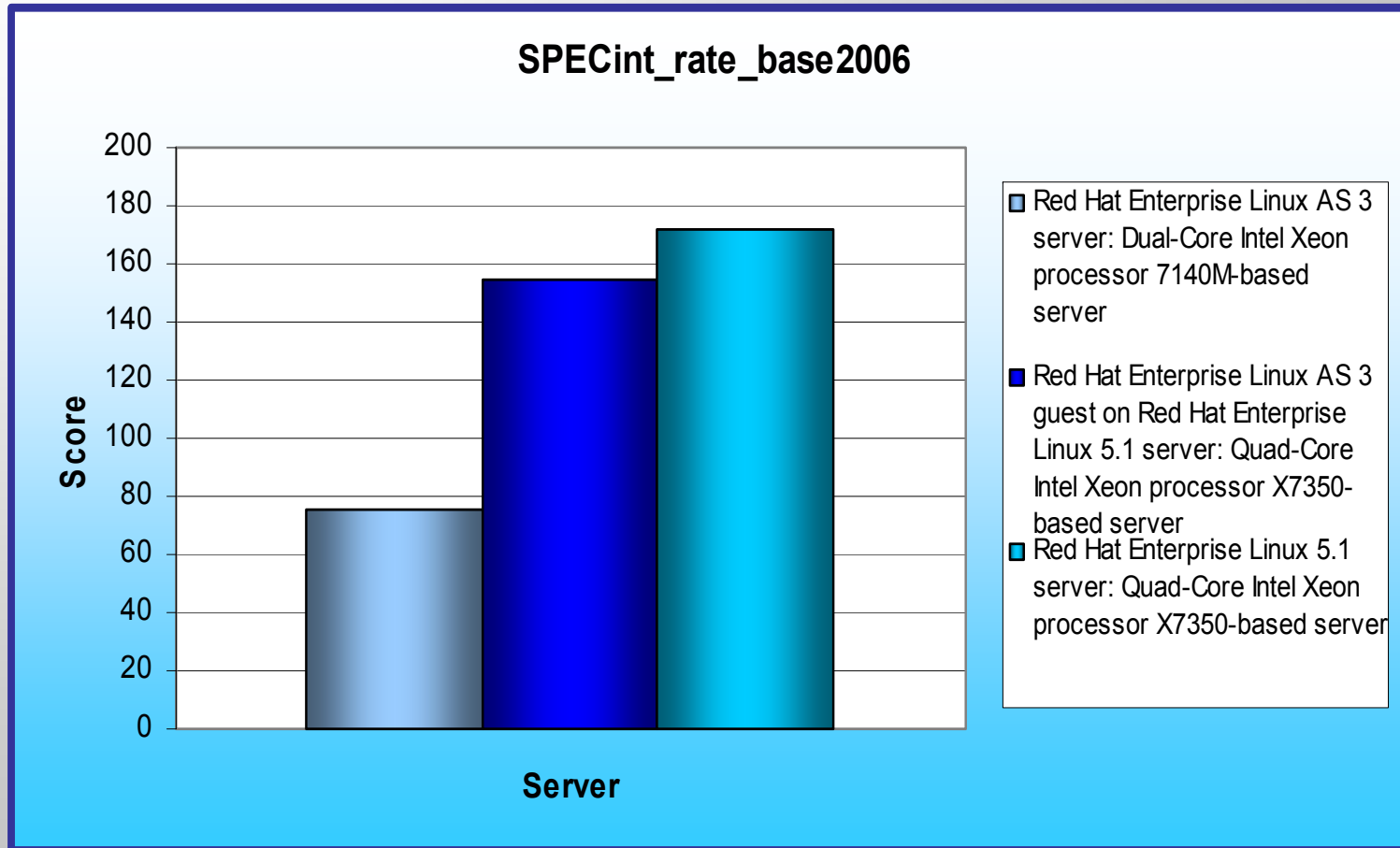
# SPECint_rate_base2006: Basics

**About the benchmark**

- Measures and compares compute-intensive integer performance
- "Rate" version runs multiple instances of the benchmark to assess server throughput

**Compiler we used**

- Intel C/C++ Compiler 10.0.025 for EM64T

# SPECint_rate_base2006 test results



**SPECint_rate_base2006**

Score (y-axis): 0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200

Server (x-axis)

Legend:
- Red Hat Enterprise Linux AS 3 server: Dual-Core Intel Xeon processor 7140M-based server
- Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server: Quad-Core Intel Xeon processor X7350-based server
- Red Hat Enterprise Linux 5.1 server: Quad-Core Intel Xeon processor X7350-based server

# SPECint_rate_base2006 key findings

- Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server delivered 126.9 percent more performance than Red Hat Enterprise Linux AS 3 server on a Dual-Core Intel Xeon processor 7140M-based server.

- Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server delivered a 104.5 percent performance increase over Red Hat Enterprise Linux AS 3 server on a Dual-Core Intel Xeon processor 7140M-based server.

- Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server delivered 90.1 percent of the performance of RHEL5.1 running native on the same server.

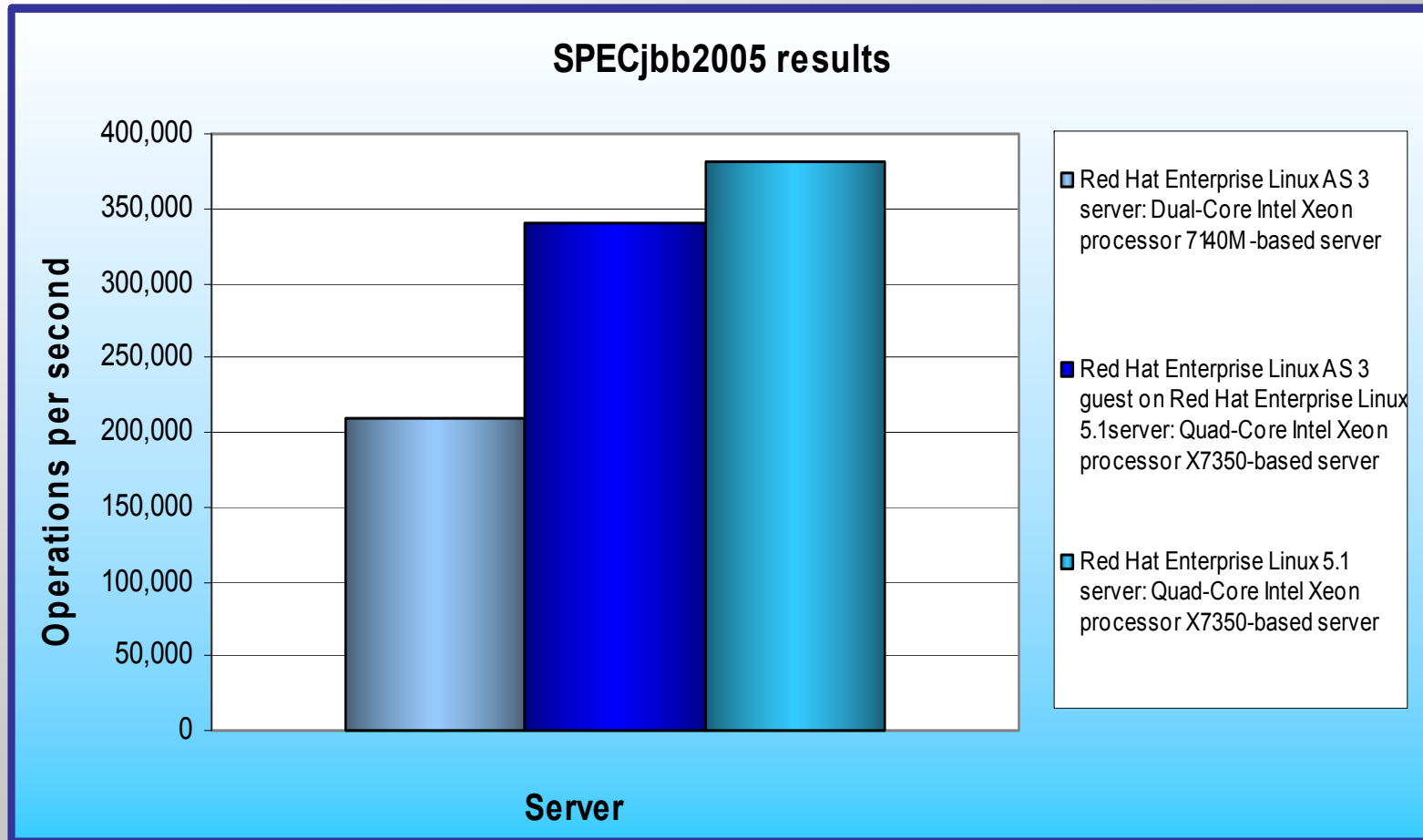# SPECjbb2005: Basics

**About the benchmark**

- Measures Java performance, utilizing multiple special data groups and multiple threads as it runs
- Reports results in business operations per second or SPECjbb2005 bops

**Java option settings we used**

-Xms3500m           Sets the minimum heap size.

-Xmx3500m           Sets the maximum heap size.

-Xns2900m           Sets the JVM nursery size.

-Xxaggressive       Tells the JVM to perform at maximum speed.

-XXlargepages       Tells the JVM to use large pages.

-Xgc:genpar         Sets generational parallel garbage collection.

-XXthroughputCompaction     Adjusts the compaction ratio dynamically based    on live data in the heap.

-XXlazyUnlocking     Determines when the JVM releases locks.

-XXtlasize:min=16k, preferred=128k     Sets the thread-local area size the JVM uses.

# SPECjbb2005 test results

# SPECjbb2005 key findings

- Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server delivered 82.1 percent more performance than Red Hat Enterprise Linux AS 3 server on a Dual-Core Intel Xeon processor 7140M-based server.
- Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server delivered a 62.4 percent performance increase over Red Hat Enterprise Linux AS 3 server on a Dual-Core Intel Xeon processor 7140M-based server.
- Red Hat Enterprise Linux AS 3 guest on Red Hat Enterprise Linux 5.1 server on a Quad-Core Intel Xeon processor X7350-based server achieved 89.2 percent of the performance of RHEL5.1 running native on the same server.

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