# The new HP Z210 Workstations: Performance Brief

The HP Z210 CMT and SFF entry workstations are the successors of the HP Z200 Workstations. The HP Z210 introduces a new Intel® micro-architecture for improved performance, processor based professional graphics and a new workstation chipset with upgraded I/O bandwidth.

HP recommends Windows® 7.

## Contents

## Technology Highlights

These are a few of the technology highlights of the new entry workstation platform:

### Processor[1,2,3]

The HP Z210 Workstations offers a choice of the Intel® Xeon® processor E3-1200 family or 2nd generation Intel Core™ i3/i5/ i7 processors, featuring a new micro-architecture in the 32nm process. The HP Z210 utilizes the Intel C206 PCH (Platform Controller Hub) designed for workstations. It now also supports the Intel Turbo Boost Technology[4] 2.0 with new Dynamic and Graphics Turbo Boost features, Intel HD Graphics P3000[5] and Intel vPro® Technology. With this processor architecture and generation, all higher frequency processors (Intel Core i5/i7 and Intel Xeon E3-12xx) are quad core. Dual-core processing is only available on the Core i3-2xxx processors and below and will not support Intel Turbo Boost Technology.

### Memory[6,7]

The HP Z210 Workstations support both non-ECC and ECC-protected unbuffered DDR3-1333 UDIMMs. The HP Z210 supports system memory sizes up to 32 GB (using 8 GB DIMMs) via two direct attach memory channels each having two DIMM slots.

### Graphics

The HP Z210 Workstations now support the new Intel® HD Graphics P3000 (on select Xeon processors) which is certified for a limited set of professional applications. The platform also supports one PCIe Gen2 graphics card (midrange 3D, up to 75W) in the PCIe2 x16 slot. By using the PCIe Gen2 x16 (4) slot, dual professional 2D graphics cards can be utilized to enable up to four 2D displays support.

**I/O Slots**

The HP Z210 Workstations provide a total of seven high-performance graphics and I/O slots. In comparison to the HP Z200, all PCIe slots now support the Gen2 speeds (starting with 5 Gb/s, bidirectional, on a PCIe2 x1 slot). An additional PCIe x4 slot is now connected directly to the processor, providing lower access latency for demanding applications. Five PCIe slots have been supported for HP Z210 Workstations, while the HP Z200 supports four in total. Two SATA ports have been upgraded to SATA Gen3 6.0 Gbps now for HP Z210 Workstations.[8]

# Performance benchmarking methodology

In addition to performance comparisons on the predecessor platform, the HP Z200 Workstation, HP is also focusing on benchmark comparisons with the previous platform, the HP xw4600 Workstation, in order to support a three-year refresh rate discussion. Customers with older systems, e.g. HP xw4400, will see even greater benefits in migrating to the new HP Z210 Workstations.

The HP Z210, HP Z200 and HP xw4600 Workstations all have similar configurations and were benchmarked at HP Workstations' Technical Consulting Labs. The benchmark testing applications were chosen from a wide spectrum of typical workstation applications representative of the markets addressed by HP Workstations over the years. They include the SPECapc benchmarks for Pro/ENGINEER Wildfire 2.0, SolidWorks 2007, 3ds Max V9, Maya 2009 and LightWave as well as the Cadalyst C2010 v5.3 Benchmark Test. Not all applications may experience similar performance improvements.

In choosing similar configurations, the key consideration was that the replacement (i.e. new) technology component would similarly priced/positioned to the older technology component. The processor and graphics configurations tested are specified on each chart. All other system configurations were selected to be as equal as possible. The benchmark tests are grouped into two broad categories: MCAD (Mechanical CAD) and DCC (Digital Content Creation).

For the MCAD segment, historically most of the applications are single threaded and hence have been unable to take advantage of multiple cores. As such, customer preference has been to choose dual core processors which in the past used to feature higher single core frequency than quad-core processors on entry workstations. It is noteworthy that this is not true anymore starting with the HP Z210 generation: in this generation, the higher frequencies are only available on quad-core processors, in keeping with the trend towards multi-core processing, with more applications being re-architected for multi-threading. As such, the benchmarks in this segment have been run on the higher dual core processors on the HP xw4600 and HP Z200 Workstations, but on a equivalently positioned Quad-Core processor for the HP Z210 Workstations.

For the DCC and Financial segments, however, more applications are multi-threaded and take advantage of multi-threading. Hence the processors chosen are all quad-core across the three generations.

The performance graphs below have been standardized to show relative performance to the base data represented by the result on the HP xw4600 configuration.

FIGURE 1

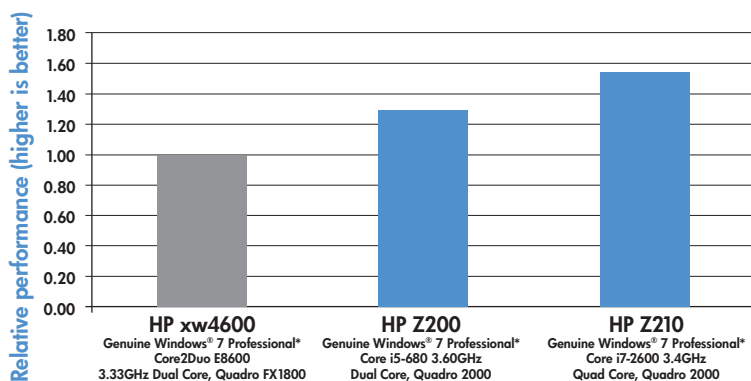## Cadalyst C2010 v5.3

January 2011



| | HP xw4600 | HP Z200 | HP Z210 |
|---|---|---|---|
| | Genuine Windows® 7 Professional* Core2Duo E8600 3.33GHz Dual Core, Quadro FX1800 | Genuine Windows® 7 Professional* Core i5-680 3.60GHz Dual Core, Quadro 2000 | Genuine Windows® 7 Professional* Core i7-2600 3.4GHz Quad Core, Quadro 2000 |

FIGURE 2

## SPECapc Pro/ENGINEER Wildfire 2.0



| | HP xw4600 | HP Z200 | HP Z210 |
|---|---|---|---|
| | Genuine Windows® 7 Professional* Core2Duo E8600 3.33GHz Dual Core, Quadro FX1800 | Genuine Windows® 7 Professional* Core i5-680 3.60GHz Dual Core, Quadro 2000 | Genuine Windows® 7 Professional* Core i7-2600 3.4GHz Quad Core, Quadro 2000 |
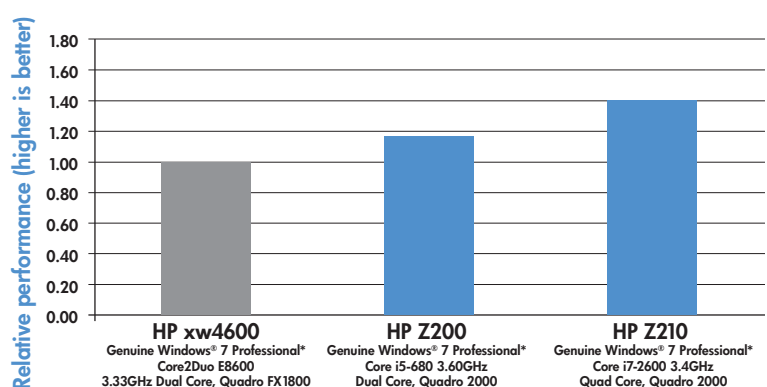
FIGURE 3

## SPECapc SolidWorks 2007



HP xw4600
Genuine Windows® 7 Professional*
Core2Duo E8600
3.33GHz Dual Core, Quadro FX1800

HP Z200
Genuine Windows® 7 Professional*
Core i5-680 3.60GHz
Dual Core, Quadro 2000

HP Z210
Genuine Windows® 7 Professional*
Core i7-2600 3.4GHz
Quad Core, Quadro 2000
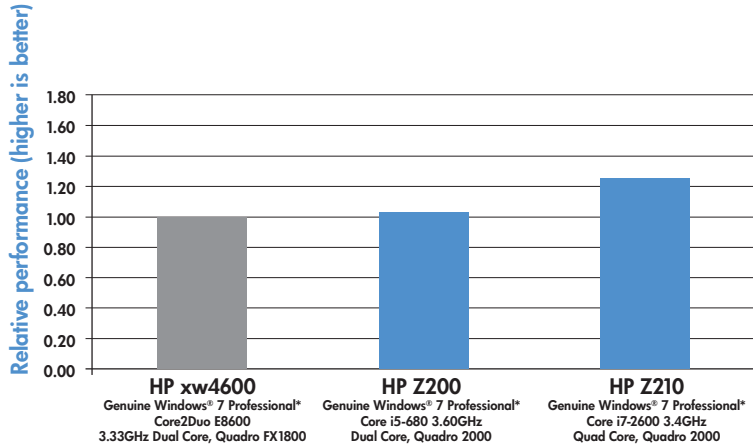
FIGURE 4

## SPECapc 3ds Max V9



HP xw4600
Genuine Windows® 7 Professional*
Core2Duo Q9650
3.00GHz Quadro FX3800

HP Z200
Genuine Windows® 7 Professional*
X3480 3.06GHz Quadro 2000

HP Z210 Xeon
Genuine Windows® 7 Professional*
E3-1280 3.5GHz Quadro 4000
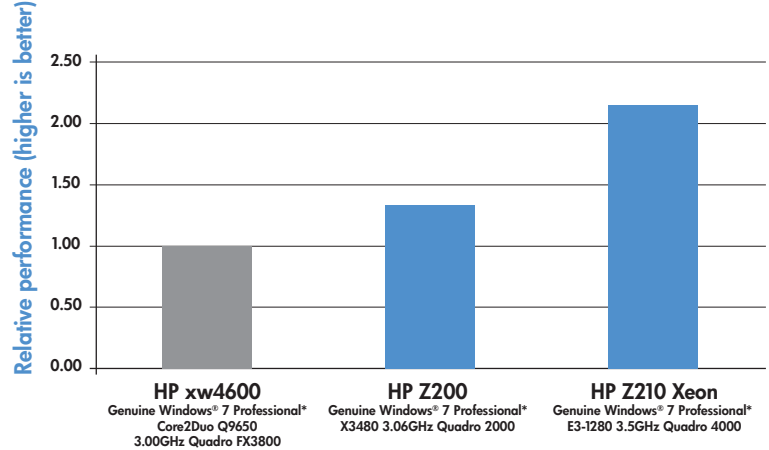
FIGURE 5

## SPECapc Lightwave



Legend: Interactive, Render, Multitasking

HP xw4600
Genuine Windows® 7 Professional*
Core2Duo
Q9650 3.00GHz, Quadro FX3800

HP Z200
Genuine Windows® 7 Professional*
Xeon X3480
3.06GHz, Quadro 2000

HP Z210
Genuine Windows® 7 Professional*
Xeon E3
3.50GHz, Quadro 4000

FIGURE 6

## SPECapc 3ds Max 9



Legend: Rendering, Interactive, Hardware shading

HP xw4600
Genuine Windows® 7 Professional*
Core2, Quad9650
3.00GHz, Quadro FX3800

HP Z200
Genuine Windows® 7 Professional*
X3480
3.06GHz, Quadro 2000

HP Z210
Genuine Windows® 7 Professional*
Xeon E3-1280
3.50GHz, Quadro 4000

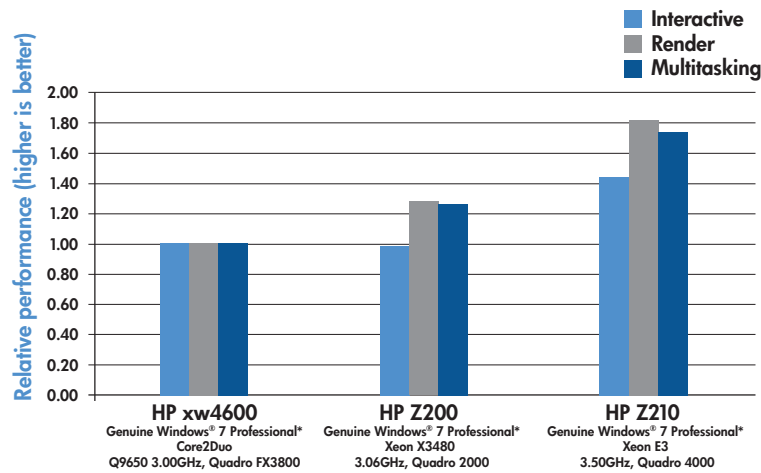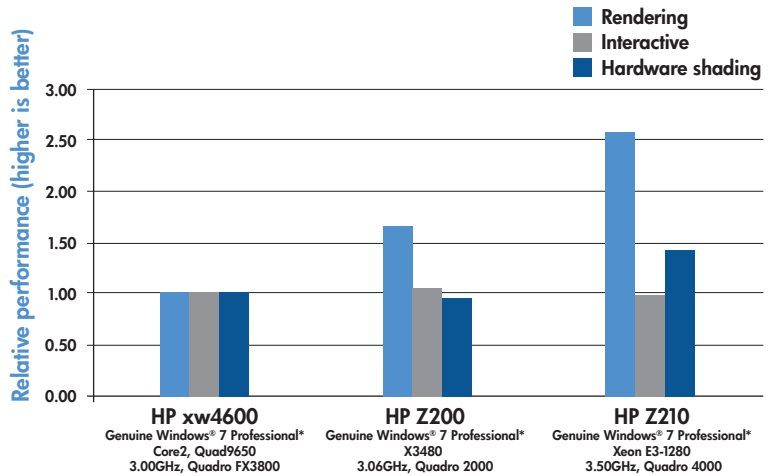## Conclusion

As we can see above, the HP Z210 Workstations shows significant performance improvements, even up to 156% on some benchmarks[9], compared to the previous generations, primarily because of technological advancements in the system and processor architecture, as well as advancements in graphics technologies for certain benchmarks. It should be noted that not all applications may experience such performance improvements, especially if the application does not load the processor or graphics to the extent that these benchmarks do. Nevertheless, customers are likely to realize significant performance gains when migrating to the HP Z210 Workstation, when running the above types of workstation applications.

Screen images courtesy of Autodesk.

\*  Windows 7 systems may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.

1  Dual-Core and Quad-Core technologies are designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; Not all customers or software applications will necessarily benefit from use of these technologies.

2  64-bit computing on Intel architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers and applications enabled for Intel® 64 architecture. Processors will not operate (including 32-bit operation) without an Intel 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations. See http://www.intel.com/info/em64t for more information.

3  Intel's numbering is not a measurement of higher performance.

4  Intel® Turbo Boost technology requires a PC with a processor with Intel Turbo Boost capability. Intel Turbo Boost performance varies depending on hardware, software, and overall system configuration. See www.intel.com/technology/turboboost for more information.

5  Intel® HD Graphics only available on Xeon® E3-12x5 processors

6  Each processor supports up to 2 channels of DDR3 memory. To realize full performance at least 1 DIMM must be inserted into each channel.

7  Intel® Xeon E3 processors can support either ECC or non-ECC memory. Intel Core i5/i7 processors only support non-ECC memory. Estimated availability for 8 GB ECC memory Q4 2011.

8  SATA hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.

9  Above results shown are based on benchmark testing done at HP's Workstation Technical Consulting Labs, with workstation market applications including the SPECapc benchmarks for Pro/ENGINEER Wildfire 2.0, SolidWorks 2007, 3ds Max V9, Maya 2009 and LightWave as well as the Cadalyst C2010 v5.3 Benchmark Test, when comparing the following workstations:
    a) HP xw4600 workstation with either an Intel® Core2 Duo E8600/Intel Core2 Quad Q9650 processor
    b) HP Z200 Workstation with an Intel Core i5-680/Intel Xeon® X3480 processor
    c) HP Z210 Workstation with an Intel Core i7-2600/Intel Xeon E3-1280 processor.
All other system configurations were selected to be as equal as possible. Not all applications may experience similar performance improvements.