HP recommends Windows.

Migrating from E/X5600 Processors

Which Processor is Right for Me?

Introduction

The new E5-2600 family of processors from Intel® offer a wide variety of choices, from frequency optimized low core count processors, to core optimized lower frequency processors. Combining this rich processor family with the variety of applications and workloads present in the workstation market makes choosing the best processor configuration a challenge for many people. This paper will look at how to decide the best path to migrate from a E/X5600 series system to an E5-2600 series system.

Application Types—Overview

Over the last 3 generations of processors from Intel, the number of cores available across the product line has increased substantially. The latest generation of E5-2600 series processors, code named Sandy Bridge, starts at 4 physical processor cores, and extends to 8 cores for the dual socket capable E5 series. This gives our dual-socket Z620 and Z820 platforms the capability of delivering 32 virtual processor cores when both sockets are populated and Hyper Threading is enabled. Unfortunately, not every application can take advantage of all the cores that are available. Due to algorithmic limitations, some applications can only effectively use 1 or 2 cores, while others employ algorithms that can easily scale to a large number of cores.

The user's workflow can also impact the number of processor cores that can be effectively used simultaneously. A simple workflow, with a small number of non-threaded applications may only need 2-4 processor cores, while a complex workflow with a larger number of applications may be able to effectively use all the cores in a richly configured Z620 or Z820 Workstation. This section will look at how application type affects processor selection.

Single threaded

Today, there aren't any truly single threaded applications of any importance running on Microsoft Windows. The standard application infrastructure provided by Microsoft will create a number of threads as soon as the application is started. However, many interactive design oriented applications rely on a few threads of execution for the majority of their computational needs. These applications include most MCAD design applications, and the modeling portion of many media and entertainment applications. That said, many of these applications support additional functionality that is employed in many workflows that can effectively use additional cores. Examples of these types of activities are PLM integration, analysis, and rendering of realistic materials in mechanical design, and rigging, animation, and rendering for digital media applications.

Multi-threaded

Some applications and workflows can effectively use a large number of cores to accelerate the pace of design and development. Most finite element analysis codes (CFD, Structural Dynamics, Thermal analysis, etc) have been developed as threaded applications that can take advantage of a fairly large number of cores. In today's analysis-led design paradigms, designers can take advantage of a larger number of cores than traditional design-then-analyze paradigm.

Today's Media and Entertainment workflows employ a rich combination of applications that can use many cores to accelerate the completion of digital content. The rendering of video and animation content is typically a well threaded operation that can scale to many cores.

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Moving from HP Z400 to HP Z420

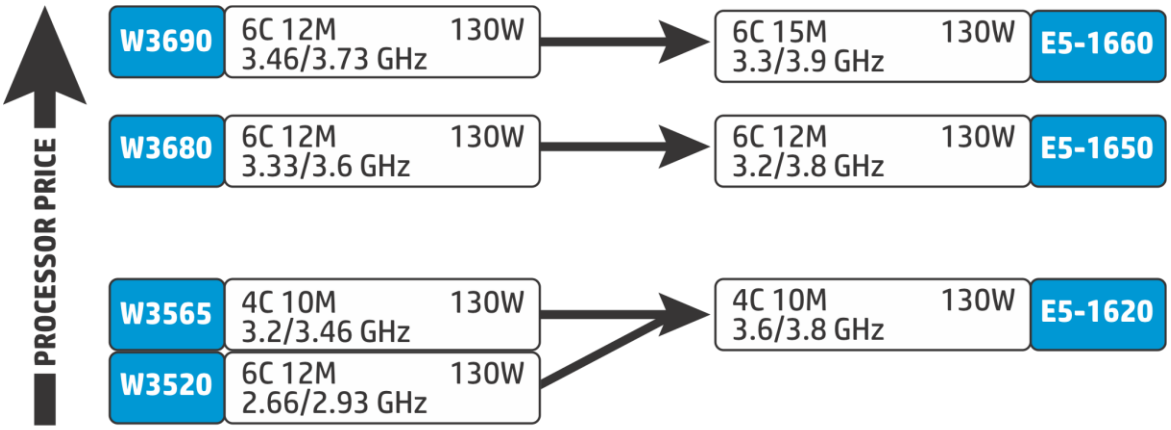
The HP Z420 supports the E5-1600 line of single socket Xeon processors. This processor family consists of 2 six core SKUs, and 3 four core SKUs. The migration from the HP Z400 is very straight forward (figure 1). For applications that use a small number of threads, and have relatively simple workflows, the frequency optimized E5-1620 will deliver a significant performance improvement for users moving from the HP Z400 to the new HP Z420.

For customers with more complicated workflows, or users of applications that are threaded, the HP Z420 offers 2 processor SKUs that have 6 cores. The mid-priced E3-1650 offers a significant performance improvement for customers moving from the 6 core W3680, or any of the other mid-priced W3500 or W3600 series processors. For customers currently using the W3690 processor, migrating to the E5-1660 is the best choice in the single socket platform. The E5-1660 is best suited for workflows where a combination of single thread performance and a modest amount of threading is required. The E5-1660 can deliver the highest frequency for non-threaded applications at 3.9GHz, and fully threaded applications at 3.6GHz when the Turbo upside is factored in.

For more complex workflows and applications that can take advantage of more cores, moving up to a dual socket HP Z620 or HP Z820 should be considered.

Migration Path for Selected 1S Processors SKUs

Figure 1



4C or 6C = the number of processor cores
x.xx / y.yy GHz = the base clock frequency / maximum turbo boost frequency

Moving from HP Z600/HP Z800 to HP Z620/HP Z820

The HP Z620 and HP Z820 support the E5-2600 line of dual socket capable Xeon processors. This processor family consists of a wide range of processors, some of which are optimized for high frequency, lower core count applications. While others are optimized for lower frequency and higher core count for multi-threaded applications. The E5-2600 offers performance benefits over the previous generation of X5600 processors through the addition of

- Higher core count (8-cores vs. 6-cores)
- Higher memory bandwidth (51.2 GB/s per socket vs 32 GB/s per socket
- Faster I/O (PCIe 3.0 vs. PCIe 2.0)
- Larger and faster L3 cache architecture
- Faster internal buses (QPI Speed up to 8 GT/s vs 6.4 GT/s)
- Dual QPI bus between processors
- Higher Turbo mode frequency

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The transition from the X5600 to the E5-2600 series is complicated by the fact that, in most cases, the base processor frequency has gone down on the E5-2600 compared to similarly priced X5600 processors. In many cases this drop in core frequency is off-set by the performance improvements provided by the previously mentioned processor enhancements.

Migration Path for Selected 2S Processors SKUs

Figure 2

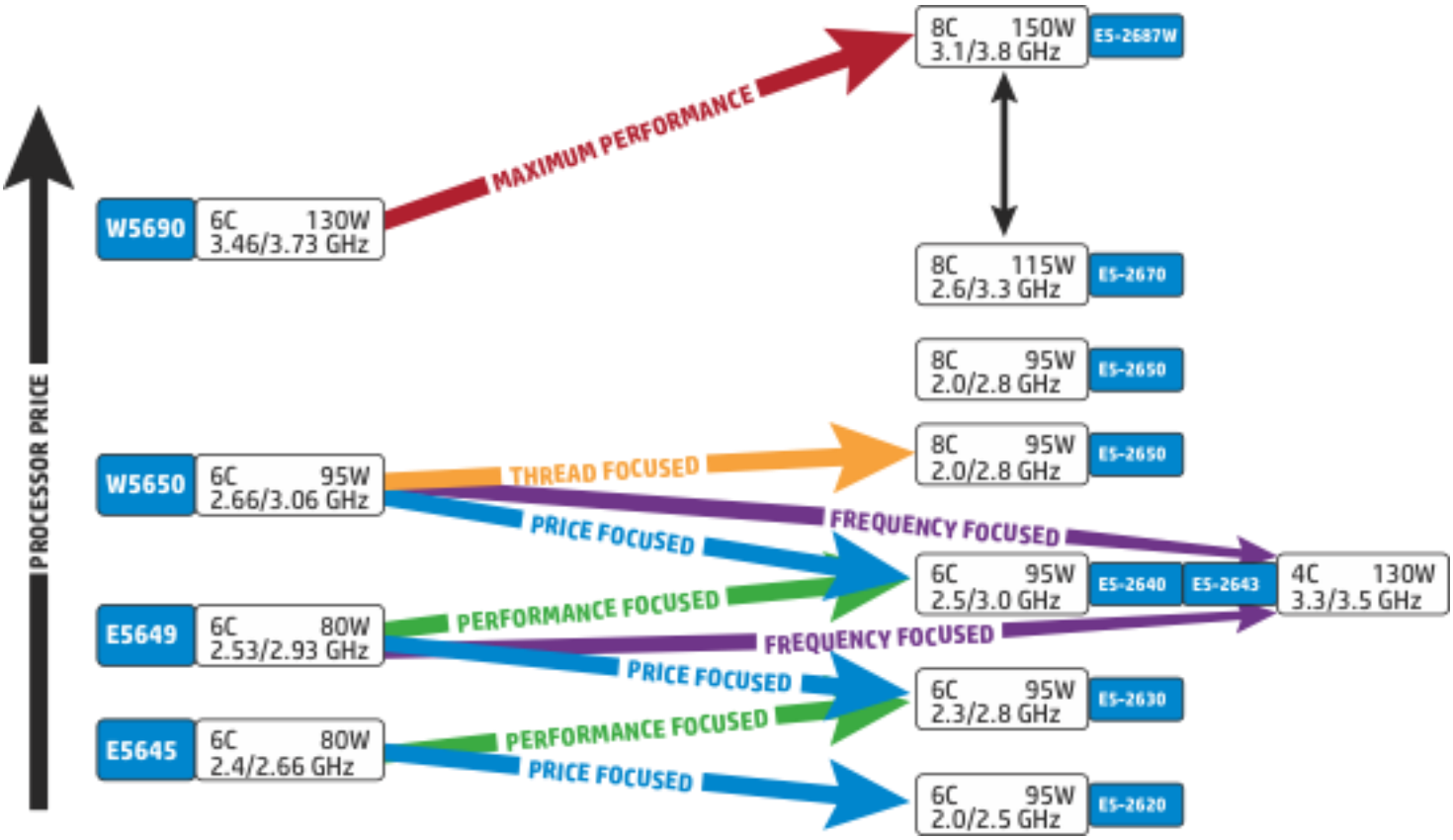

Figure 2 shows the suggested migration path for select X5600 processor SKUs to new E5-2600 processor SKUs. There are typically two and sometimes three paths that can be taken depending on the user's application, the size and complexity of the model and workflow.

Note: The processor migration paths shown in figure 2 cover the most popular paths. Similar migration paths can be drawn for the remaining supported processors.

We will now explore the migration path options for predominate market segments.

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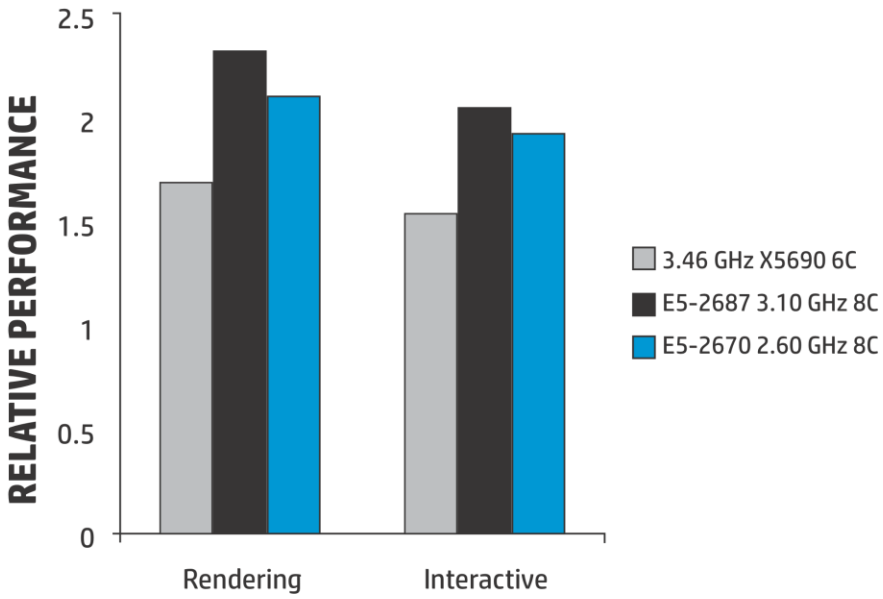
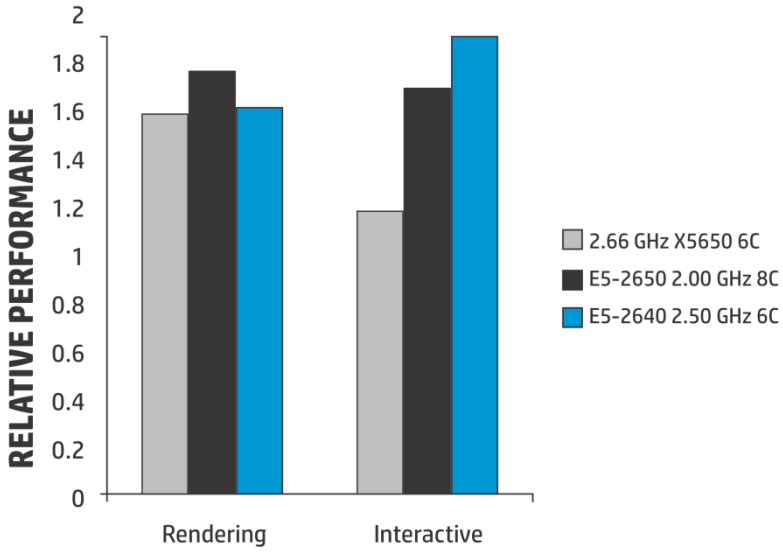
Media & Entertainment

The following chart shows the performance of migration paths for an M&E workflow, using the 3D StudioMax application, moving from the top processor SKU on the X5600 line to the top processor SKU, and a slightly lower priced SKU on the E5-2600 line. The E5-2687W processor offers the best performance option for migration, while the E5-2670 offers a smaller but significant performance improvement at a slightly reduced price.



SPECapc for 3ds max V9



This chart shows the performance of the same M&E workflow at the mid-point of the X5600 SKU line-up. In this case the migration paths offer a new choice to the users. The E5-2650 has more cores, and performs better at threaded operations such as rendering, while the E5-2640 has the same number of cores as X5650, but higher frequency than the E5-2650. Here the user must decide the right balance of performance for their particular workflow.

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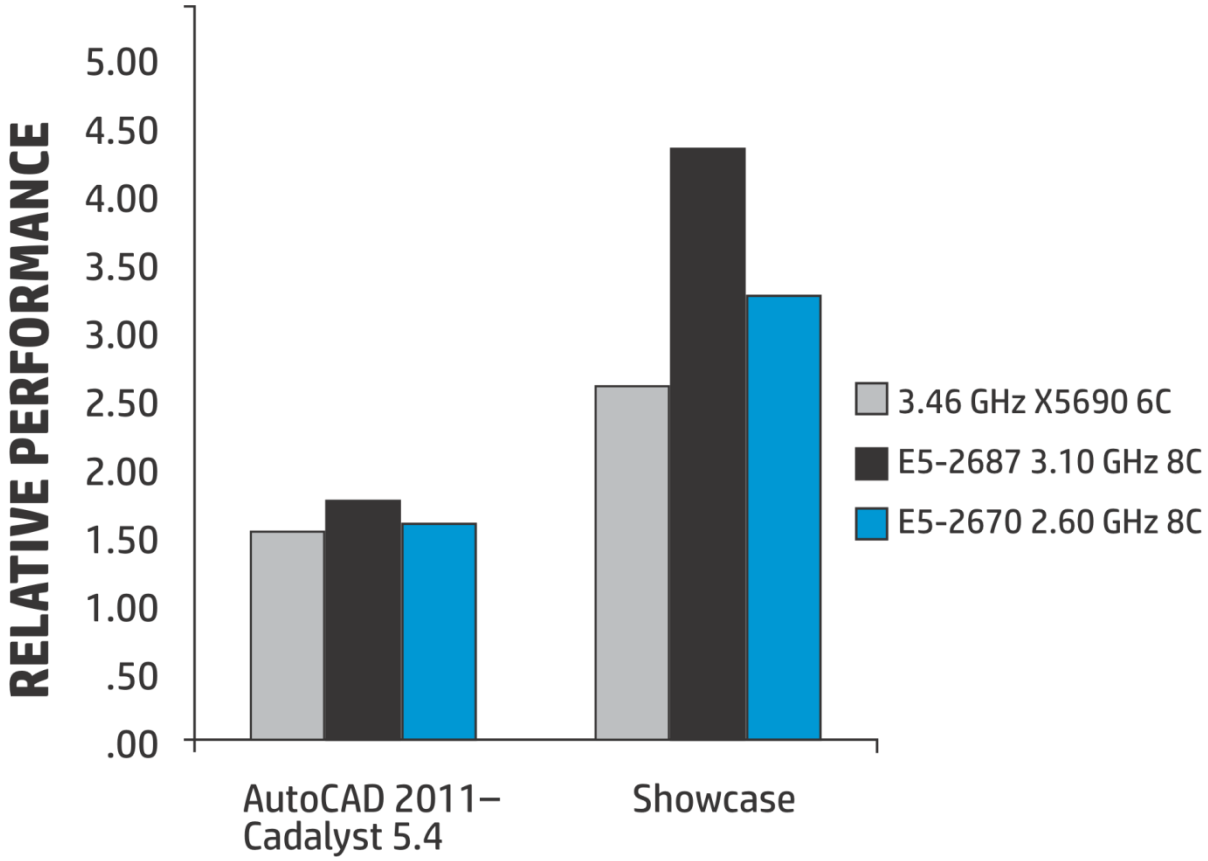
Architecture, Engineering and Construction/Manufacturing

The next charts look at a typical AEC workflow that includes interactive design and realistic rendering. Once again we look at moving from the top processor SKU on the X5600 line to the top processor SKU, and a slightly lower priced SKU on the E5-2600 line. The E5-2687W processor offers the best performance option for migration, while the E5-2670 offers a smaller performance improvement at a slightly reduced price.

This chart shows the performance of the same AEC workflow at the lower mid-point of the X5600 SKU line-up. In this case the migration paths offer a new choice to the users. The E5-2640 has better performance than E5649 for all operations, while the E5-2630 has roughly equivalent interactive performance, and better threaded performance for operations such as rendering. Here the user must decide the right balance of performance for their particular workflow.

AEC Workflow Performance



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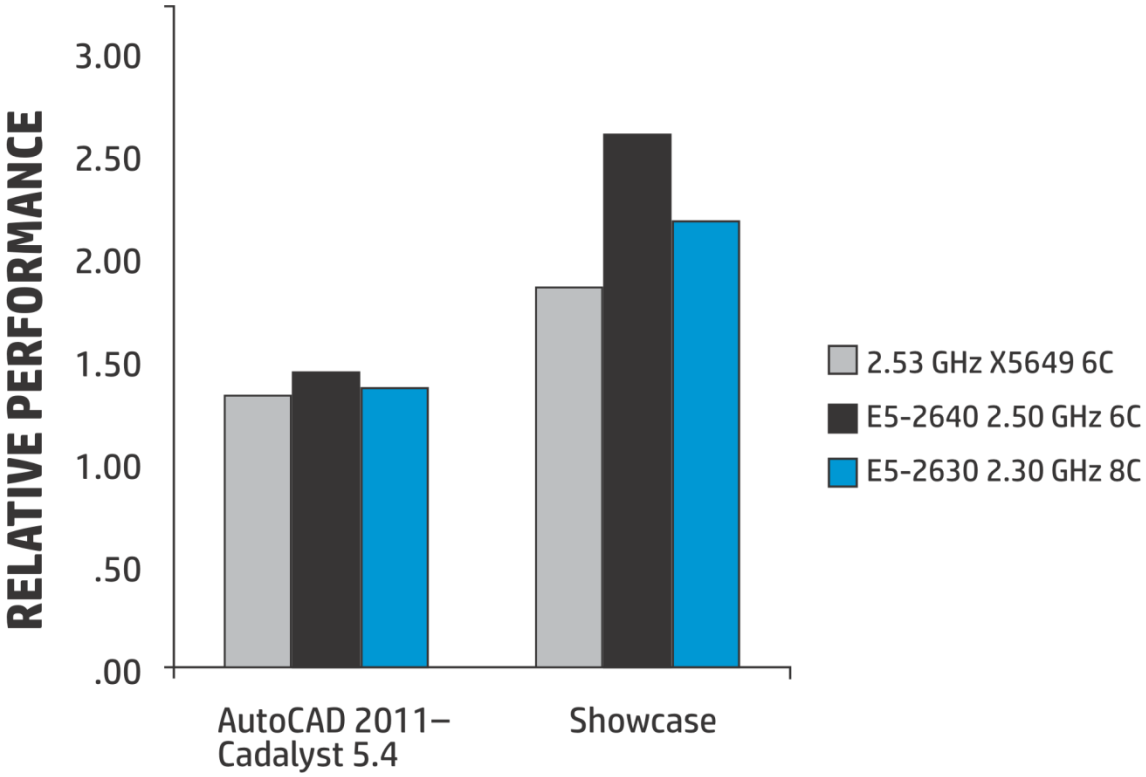

Conclusion

Moving from the E/X5600 family of processors to the E5-2600 family of processors offers the user a variety of options. This gives the user the flexibility to maximize performance for a specific type of workload, either maximizing processor frequency for the best lightly threaded performance, or maximizing core count for more complicated, threaded workflows.

Additional resources

hp.com/go/whitepapers

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