



Can't Anybody Here Play This Game?

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Casey Stengel managed the New York Yankees for twelve years. During his tenure the team won seven World Championships. In 1962 the newly founded New York Mets named Stengel as their manager and went on to become one of the worst teams in baseball history, finishing with a 40-120 record. After one especially problem-plagued game, Stengel moaned sadly, "Can't anybody here play this game?"

Insight 64 wouldn't be a bit surprised if those same thoughts passed through Paul Otellini's mind on Monday. A series of miscues marred Craig Barrett's last year at Intel's manager; projects were cancelled and roadmaps rewritten right and left. Otellini moved into the CEO role in May and the company appeared to settle down in the early innings of 2005. The transition from megahertz to multi-core seemed well underway, when Otellini signaled his bullpen and brought in Paxville DP, Intel's first dual-core server chip, to relieve the struggling single-core Irwindale. AMD's heavy-hitters, the dual-core Opteron and Athlon X2, loaded the bases. Turion came to the plate, swung at Paxville's first pitch and hit a short blooper that should have been an easy out. Unfortunately, Intel's Whitefield dropped the ball and allowed two AMD runs to score. Otellini once again looked to his bullpen, but Gelsinger, the pitching coach said Montecito and Dunnington, his two ace relievers, needed a few more innings more before they would be ready to pitch. Just as Otellini thought things couldn't get any worse, the scoreboard flashed the latest market share data from Mercury Research. Intel's share of the global x86 market had dropped from 82.2 to 80.8 percent in the third quarter, while AMD had moved from 16.2 to 17.8 percent. Worse still, AMD's share of the desktop processor market grew to 20.4 percent, the first time in years it had passed the 20 percent mark. This might weaken AMD's antitrust case with the umpires, but it wasn't going to help Intel win the series. What's a manager to do?

Baseball metaphors aside, Monday probably was a day Paul Otellini would just as soon forget. The execution gremlins that marred Craig Barrett's last year reëmerged to mar Otellini's first. Intel added six months to the release dates of its dual-core Itanium products, moving Montecito from January '06 to "Mid 06," Montvale from 2006 to 2007, and Tukwila, the first Itanium to share Xeon's hardware infrastructure, to 2008. The Tukwila push-out hardly matters, since Intel cancelled Whitefield, the first Xeon slated to share its infrastructure with Itanium. In Whitefield's stead, Intel added a new processor, Tigerton, to its 2007 line-up. Tigerton will use a Xeon-specific infrastructure that poses less risk to Intel's struggling design engineers. This means Intel's first opportunity to align the Xeon and Itanium infrastructures moves from 2007 to 2009.

At this point, you may be wondering why anyone should care whether Intel can align its Itanium and Xeon infrastructures, given that the company sells upwards of seven million Xeons a year, but only a few hundred thousand Itanium processors. The answer has little to do with Itanium, a product line whose long term survival seems increasingly challenged, but everything to do with Xeon. More specifically with the challenge AMD's Opteron poses to Xeon.

AMD originally positioned Opteron as a "64-bit x86" at a time when Intel offered only 32-bit x86 processors. Intel buried its head in the sand for a while, but eventually introduced its own 64-bit Xeons, a move with fatal consequences for its Itanium strategy. But Intel's 64-bit Xeons still struggle against AMD's Opterons with regard to performance, power, and performance per watt, the latest metric of interest to many IT buyers. Much of AMD's performance advantage stems from the so-called "Direct Connect Architecture" that puts a DRAM controller on every CPU, and provides high-speed "HyperTransport" links that eliminate the need for a traditional "front-side bus" arrangement. All other things being equal, Direct Connect Architecture boosts AMD's performance by about 15 percent in uniprocessor dual-core configurations, 35 percent in dual-processor dual-core systems, and upwards of 100 percent in four-way dual-core systems.

Neither Intel's move to dual-core Xeons nor its move to 65nm Xeons will likely allow the company to reclaim the performance lead from AMD. CPU performance depends on both the ability to move data within the chip, and also on the ability to move data on and off the chip. The faster the on-chip operations, the more important the ability to move data between the chip and the rest of the system becomes. From Insight 64's perspective, the single best way to accelerate the movement of data between the chip and the rest of the system is to locate the DRAM memory controller on the CPU itself, a step that IBM, Sun and AMD (among others) have taken, but which Intel has resisted to date.¹ If Intel is ever to reclaim the performance lead from AMD, it must make the transition to an on-chip memory controller.

That's why the change from Whitefield to Tigerton in Intel's 2007 lineup raises such concerns in our mind. Intel slated Whitefield (a Xeon) and Tukwila (an Itanium) as its first processors to incorporate on-chip memory controllers. Tukwila will still use this approach, but Tigerton, Whitefield's replacement, will rely on a memory controller built into the chipset that supports the CPU, Intel's traditional approach, rather than a controller built into the CPU itself. Given the two year cycles that drive Intel's server roadmaps, this means that Intel will not be able to field a server processor with an on-board memory controller until 2009 at the earliest. Between now and then, we see little likelihood that Intel will be able to claim performance leadership.

Of course, few IT buyers base their purchase decisions solely on performance. Some base their decisions on vendor reputation or past purchases, areas where AMD is at a decided disadvantage to Intel. Other factors, including power, thermal dissipation and performance per watt also enter into the equation. Intel's current line of server chips loses to AMD on all these measures, but Intel will improve with regard to these latter metrics if it executes reasonably well on its (revised) roadmap. Nevertheless, customers who base their purchase decisions on performance or price/performance will find AMD's offerings increasingly attractive for years to come. By the time Intel positions itself to challenge AMD on the performance front, the market segment share dynamics between the two companies will likely have shifted significantly.

¹ Intel's phobic reaction to on-chip memory controllers is somewhat understandable. Both of its earlier attempts to incorporate this technology in its processors (the 386-SL and the stillborn Timna) ended in disaster.