

## OSS/BSS in the Real World

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**Leveraging the power of multi-processing technologies requires OSS/BSS providers to overhaul the entire application architecture**

For years, software developers and hardware manufacturers have been looking forward – dreaming – of the day that these two independent pursuits would finally come together and realize the power in their combined quest.

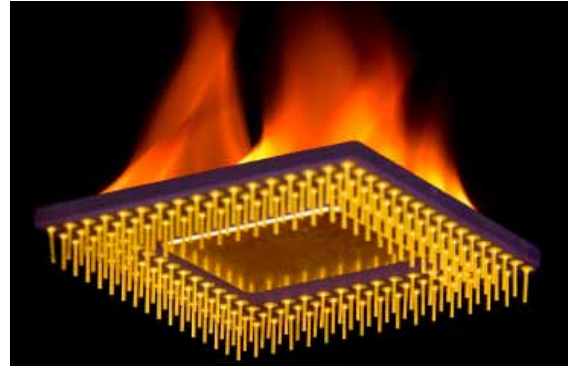
As processing speeds have continued to increase and applications have eagerly gobbled up that additional power, the outer limits of silicon's base properties are being reached. The heat generated by faster processing speeds would, ultimately, lead chips to self-destruct in a blaze of glory.

Okay, chips are small, so maybe not a blaze of glory, but you get the picture: Go too fast and your chip will burst into flames.

Thus, the theory of multi-processing was born. It has, however, taken decades to make it a reality. Big-name manufacturers like Intel, IBM, AMD and Sun have all launched multi-processor lines in recent years. In the first half of 2010, Intel will ship an 8-core machine hyper-threaded to 16 cores on a single chip. These developments are becoming commonplace (and affordable) for all enterprises. So, we can just keep going faster and faster and crunching more and more data with these bigger, better, hyper-threaded multi-core processors, right? That's where the theory falls apart. It seems software actually has to be programmed to take advantage of multi-processing. Run traditional software on a multi-core processor and it will just use one of the processors with little boost in performance. Optimize it for the multi-core environment and watch the performance numbers go through the roof.

This changes everything.

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### Development Strategies for the Multi-Processing World

While the adoption of multi-processor hardware is a good news story, it does force software developers to make some significant decisions about the future of their product offerings.

"We have reached the upper end of what single processors can do to improve system performance. You cannot keep throwing faster hardware at performance issues," said Ray Shear, Sr. Software Architect at Info Directions, Inc. "If you fail to fundamentally re-architect the application to take advantage of multi-core processing, you will quickly reach a point of diminishing return."

The problem is software development for the multi-processing OSS/BSS world requires a much deeper understanding of how all the tasks that surround billing actually work. Developers need to recognize the interaction between the operating system, the development tools, the servers, etc. The engineering work is far more granular and calls for additional effort in planning the task division and synchronization of concurrent processes.

Although still largely untouched in many commercial applications, this land is not exactly uncharted.

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Many of today's leading technology developers already exploit hardware and software concepts that support this approach, such as:

- **Parallel processing** – A form of computation in which data is broken into smaller pieces so the calculations can be completed simultaneously, in parallel. Parallel processing optimizes the performance gains enabled by multi-core chips. Ericsson has introduced functional language and high parallelism to run some of its most recent switches. Microsoft's Dryad research project offers significant insights into coarse-grained multi-processing technologies that leverage both task and data partitioning in order to move data faster, and with greater stability. For the OSS/BSS, reliance on a single billing engine is eliminated and the concept of a "billing farm" instituted to serve as the workhorse for billing operations.

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immutable data includes the concept of writing forward to multiple databases, rather than backwards to a single database. Not only does this streamline data processing, it also contributes additional stability and reliability for complex operations. The OSS/BSS will benefit from parallel programming research in the form of functional languages or functional extensions to existing object-oriented languages, as well as their integration with frameworks that provide underlying support for parallel processing.

- **MapReduce** – Patented by Google, MapReduce is a software framework that supports



- **Immutable data** – Borrowing from the idea of immutable objects, which are objects whose state cannot be modified after they are created,

distributed computing on large data sets on clusters of computers. MapReduce brings the OSS/BSS significant capabilities in scalability

and allows increasingly large data sets to be managed on less costly systems.

- **Cloud computing** – Cloud computing or “Platform as a Service” (PaaS) provides the final element of the enhanced OSS/BSS, creating a dynamically scalable architecture that enables new consumption and delivery models for IT services based on the varying needs and business models of the providers served. Clouds can be hosted by a cloud provider (e.g. Microsoft, Amazon), on premises or a combination of the two. Cloud computing provides not just a way of increasing hardware utilization, thus lowering cost, but it also provides a way of commoditizing the software services that support applications.

With the technology table set, telecommunications service providers should expect some remarkable transformations in the performance, commercialization and service offerings related to the OSS/BSS in the coming months and years.

#### **Changing Performance, Delivery and Service**

By programming the application to leverage multi-processing, performance gains are not just incremental based on the use of multiple processors and multiple data streams (i.e. four processors and four data streams equals four times as fast). Billing performance under this design model can increase by a factor of 50 with only 5 hardware cores and standard tools. For OSS/BSS providers, this can mean the ability to conduct everyday billing operations in a fraction of the time and to process many more times the volume overall.

“As OSS/BSS providers we are always pushing the application for performance gains so we can make current clients happier and secure larger customers,” said Shear. “With multi-processing technologies the future is not about evolutionary advances, we are talking about revolutionary changes that remove performance/capacity as a differentiator and push the service component to

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the forefront.”

Just as marketers are driving toward the ability to deliver individualized advertising messages, the OSS/BSS world is recognizing a similar opportunity to create individual commercialization strategies that meet each client’s unique requirements. Software, hardware and service management elements can work together to create a delivery model that gives telecom service providers exactly what they need in terms of managing the risks associated with maintenance downtime, service level agreements, performance requirements, and much more.

“These developments will fundamentally change how OSS/BSS providers deliver and price their service,” said Shear. “Look for new mixes in service levels and product offerings that are distinctively suited to each service provider. Providers can craft a support and service model that complements their value proposition as a business.”

Add in the ability to use Web services APIs and telecom service providers can also create applications that leverage the OSS/BSS to create solutions that meet the unique needs of their business and its clients.

“All of these changes allow the OSS/BSS to morph and change for each client without the core functionality changing. We are talking about price/performance flexibility that creates greater predictability and controls costs for both providers and customers,” said Shear. “While this is certainly a model that we expect to see from companies like Google and eBay, apply it in a vertical like OSS/BSS and you are breaking new ground.”

### So, How do We Get There From Here?

The first thing to remember is that there is no way to achieve these gains without re-architecting the software application.

“Multi-processing technologies represent a whole new way of looking at the data and how it moves through the OSS/BSS,” said Shear. “There isn’t an easy way to just translate the existing code and there still aren’t a lot of developers out there with the skills to put all of these concepts together.” The good news, however, is that platform operators like Microsoft have been investing significantly in the production tools needed to optimize applications for parallel processing. Visual Studio 2010, C#, SQL Server 2008, Window Server 2008, the new F# functional language and Windows IIS are essentially “out-of-the-box” tools that form the foundation for re-architecting applications to run in a multi-processing environment.

“While knowledge of the data may require a specific level of expertise, there are no specialized tools needed for the development,” said Shear.

“There has definitely been a movement in platform development that makes it accessible for most OSS/BSS developers. For instance, Windows Server now supports crucial components of multi-processing design like Non-Uniform Memory Access (NUMA) optimization. The tools are here.”

Next, there is a significant hardware investment to capture all the elements required to make the

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most of the performance, reliability, stability and scalability enabled by advanced software design. “Running a multi-processing data center requires a lot of specialized skills in network design, centralized storage and virtualization,” said Shear. “Again, the knowledge of how the data interacts with the processors, databases and servers requires some highly focused talent.”

Finally, organizations need to have strong control over their service capabilities and offerings in order to leverage all the advantages these advances provide. Industry standard practices for service management like those defined through the Information Technology Infrastructure Library (ITIL) and ISO/IEC 2000, help companies create, manage and measure their service delivery experience.

“It really takes all three of these elements – hardware, software and service – to take full advantage of what is changing out there for OSS/BSS providers and their clients,” said Shear. “There is a lot that goes behind the scenes in making this work, but the payoff is a true transformation of the OSS/BSS.”

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### About Info Directions

Info Directions, Inc. designs, hosts and installs net-centric billing, rating, order management, workflow, selling and point of sale solutions for the convergent communications market. The company’s CostGuard® OSS/BSS, Advance Pay, Point of Sale and OnlineBill solutions help wireline, mobile and convergent providers eliminate the complexity of selling, activating, managing, billing and caring for their

customers. With the flexibility to support diverse business models, CostGuard facilitates the meaningful exchange of information throughout the carrier organization and with its partners, suppliers and end users. With CostGuard, service providers have the foundation needed to enhance revenue, reduce costs and foster a better customer experience. Visit [www.infodirections.com](http://www.infodirections.com) for more information.