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## TOUCH THE SCAI

by Van Beach

*While SCAI (Scalable Cloud Actuarial Infrastructure) is a somewhat lighthearted reference to "the Cloud," the implications of cloud-based infrastructures such as Microsoft Azure are serious business. Cloud computing is a major disruptor to nearly all software products, and actuarial software is no different. Insurers need to start thinking about how they are going to work with their vendors to move to the next level of actuarial infrastructure—"touch the SCAI."*

Last year, I wrote an article for CompAct where I playfully dubbed the term "SCAI" (pronounced sky) and discussed how shared computing resources from multi-core servers to public clouds like Azure contribute to a continuum of solutions to support actuarial processing. While SCAI is a somewhat lighthearted play on words, the concept and implications are all serious business.

The Cloud is here to stay. Microsoft has publicly doubled-down on their "all-in" position with regard to Azure (Microsoft's cloud infrastructure). Specific to actuarial computing environments, Microsoft has enabled a bridge between on-premise HPC (High Performance Computing) clusters to Azure through their recent release of Server 2008. Amazon, Google, IBM and others are all investing in cloud infrastructures. With each new software vendor that moves to the cloud and each company that utilizes a cloud-based offering, the fear and uncertainty break down and the very real business benefits come into focus.

**Actuarial Computing Capacity Delivered Through the Cloud**

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The following scenario still holds today:

Results are needed immediately, but the in-house compute cluster (i.e., the grid of servers used to parallelize computations) is already fully utilized and there is a queue of jobs that will keep the resources occupied for days. A job could get bumped, or priorities reordered, but even with all 200 computing resources (cores) in the cluster available, running another 1000 scenarios will require over 10 hours to complete.

The 10-hour run-time is certainly a dramatic improvement over running on a single computer (which was the situation before the compute cluster was installed), but it is still far from ideal.

Instead of 200 cores available 365 days a year, a more effective distribution might be 2,000 cores 36.5 days a year. At certain times, 20,000 cores for 3.65 days would be the optimal configuration. If computing capacity were marginal cost, these would all be equivalent. In addition to marginal cost, the ideal solution would also provide infinite, on-demand, zero-footprint resources.

This "nirvana" solution—effectively infinite resources that are on-demand, marginal cost, and zero-footprint—exists. Further, this cloud-computing infrastructure is being used to provide the computing capacity to back mission-critical Solvency II actuarial models and will regularly utilize multiple thousands of cloud-based CPUs. And when the calculations are done, the resources are de-provisioned, and the meter stops running. Touch the SCAI.

#### **Bridging On-Premise and Cloud Computing through Microsoft HPC Server**

In-house computer clusters to support actuarial calculations have provided a computational "backbone" for actuarial projection work. The key innovation that triggered this expansion was the introduction of Microsoft HPC—a cost-effective, centralized operating system that turns a bank of servers into a scalable resource that can be made broadly available. In recent years companies have continued to expand their on-premise computing capacity and are thoroughly invested in this environment. As such, a cloud-only option is not practical.

However, it seems inevitable. To help illustrate this coming reality, let's contrast the process for bringing a new bank of servers online within a traditional grid farm to a Cloud approach using MS Azure.

With a traditional grid farm, servers are delivered and a rack is

constructed where each server needs to be network connected, plugged in, configured, tested, etc. This happens in a room with special cooling, power, and surge protection. Expert technicians are often involved for the setup, configuration, and maintenance of the grid farm. This process, expertise, and footprint is redundant across thousands of companies.

Now consider bringing several thousand new Azure servers online instead. A huge container the size of a semi-trailer is dropped off at what looks like a giant parking lot. A single large cable is hooked up. Immediately, the thousands of servers boot up, automatically configure themselves, and bring themselves online within minutes. Further, the maintenance cost ratios for Azure servers are a fraction of in-house servers. The efficiencies are too significant to ignore.

The R2 release of Microsoft Windows HPC Server 2008 aims to bridge the gap between on-premise HPC Clusters and Azure. R2 enables a "Burst to Azure" capability where on-premise resources can be augmented with Azure resources—so the cluster can be expanded virtually. Jobs are still submitted to the local cluster, but can then be "re-routed" to execute on Azure. This feature provides companies with an option to blend in-house and cloud-based computation resources. Touch the SCAI.

### **The Role of the Application**

In most cases, the software vendor must cloud-enable their product, so the benefits of cloud-computing will not necessarily be available (or effective) for a given actuarial projection software application. Further, there are at least two levels to consider—integration and optimization.

At a minimum, an application needs to provide an integration layer to make the computing option available. For example, there needs to be an integration layer between the application and Microsoft HPC for the Microsoft compute cluster to be available as a compute option.

It is a different question to ask whether the application has been optimized for the given computing option. With a cloud-based infrastructure such as Azure, where all resources are essentially identical, the vendor can begin tailoring their application to run effectively in that environment. Further, the vendor can build additional controls, redundancies, and safeguards to ensure the environment is robust, secure, and controlled.

In short, working with a cloud platform like Azure requires a tremendous amount of effort and expertise on the part of the

application vendor to utilize the cloud resources optimally. If done well, however, a SCAI can reduce maintenance costs, improve turnaround time for calculations, and reduce risk.

### Summary

The need for actuarial computing capacity is not going to recede. To meet regulatory and risk management requirements, companies will need to find solutions to this capacity challenge. Public clouds such as Microsoft Azure are emerging as a transformative technology across many applications including actuarial software—assuming your actuarial projection software can support the cloud. The question is no longer "if" additional capacity is needed. The question is "how" the capacity can most effectively be provided. Insurers need to move to the next level of actuarial infrastructure.

It's time to touch the SCAI.



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