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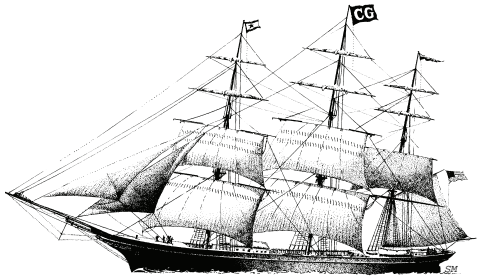

Navigating Information Technology Horizons℠

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A Hybrid Solution for *Xtreme* Information Use — Hoplon Leverages IBM's Cell/B.E. and System z

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To be effective, a solution has to satisfy all stakeholders, not just in the short term but also over time. In the case of *massively multiplayer online games* (*MMOGs)*, the conditions for satisfaction go well beyond traditional spelling, they are truly *Xtreme*! Millions of players, each with their own strategies and amassed resources, are playing with each other across a number of well-rendered universes, each with its own rules of nature. The players want the freedom to go wherever they are permitted, and they want a full range of strategic options with which to achieve their goals. They are not playing against constructs but against real people – so each game will be different. Their loyalty depends on an unbroken litany of good experiences.

This gives the games' masters a clear set of extreme challenges. They must support not a million instances of *Super Mario* but millions of players each with preferences, accessories, and strategies – and a desire to persist. All will move through the game environments in different and unpredictable ways. Interaction between players and the unpredictable demands that such interaction generates is part of the allure. The game must evolve over time to provide a fresh experience to its regular players. It must be supported by resilient technology in order to provide quick responsiveness in a smoothly continuous experience. The technology must be scalable and secure so that the game environment and the players' experience is not interrupted. All this must be supported by a variety of pay-to-play, hosting, and product placement (advertising) options.

So what does this have to do with enterprise computing? Well, actually, quite a lot. The information that technology supplies about a business is now considerable and comprehensive. Deft analysis and presentation of that information via dashboards and portals lets an organization play better that incredibly serious game called *business*. As with MMOGs, in business there is no sure route to success. In most cases, things often do not go as planned. If they did, one would find that interesting opportunities were missed. Thus, the challenges and complexity are similar and they also underlie the virtual worlds and other 3-D Internet experiences that businesses are leveraging to connect better with customers and partners.

Hoplon Infotainment, a MMOG game developer based in Florianopolis, Brazil, was seeking a flexible infrastructure to support on a global basis its Sci-Fi-style *Taikodom* game. The environments of the game are compute-intensive simulations, layered into a rich and unpredictable backdrop for the gamers' *avatars*, which move through and between the simulations at will. Simultaneously, the gamers interact and buy, sell, and expend elements in a transactional manner, rather like commercial entities. Because of the intermittent nature of game playing, all that happens has to be captured and preserved until the player next logs on. So, flexible support of atomic rules, resilience, security, and scalability are all critical requirements. They must be provided in a cost-effective environment *that is not brittle*. **Hoplon chose for their architecture an IBM combination of *BladeCenter QS20* (*Cell/B.E.* blades) and *System z mainframe.*** For more details of why this choice was made, and how it has played out, please read on.

IN THIS ISSUE

How Games are Built

Games are built in layers and overlays. Different dimensions of simulation provide the backdrop and ambient character of the worlds. A gamer's ID is another dimension, carrying with it attributes that aggregate and change over time.

The environment also must *support* and *persist* transactions of inventory, commerce, and banking. These may involve any or many of the people who are sharing the same space. They carry all the requirements of a commercial business transaction.

Both elements must scale as needed. Both kinds of elements will be evolved over time, increasing the richness of the experience. All of these changes must not interrupt the smooth functioning of the game or the experience of the gamers.

The computing requirements of these two aspects of game support are very different. Simulation is compute-intensive. It has to share information between the people sharing the particular space that the simulation covers, but, as one might say, all the action is local. When the player exits the space, he becomes another simulation's problem. Transactions, on the other hand, are more lightweight in their use of resources but heavy on their need to link to other processes to keep the books straight.

Hoplon's Experience

It all started with Hoplon CEO Tarquinio Teles' attendance at an *IBM PartnerWorld* conference in Sao Paulo, Brazil, in 2003. He attended a *grid-computing*[1] seminar that discussed service-oriented architectures. He realized that the combination of the two was exactly what he needed. A useful conversation and exchange of cards with the presenters followed. After Teles raised some funding, he reopened communications with IBM and, over a lunch in Brazil, worked out the basic strategy.

Hoplon's developers worked in a Wintel environment. Teles knew that to support their long-term ambitions for global distribution of their multi-player game, they would need an environment that was massively flexible and, preferably, *service oriented*[2] at a hardware and software level so that it could scale and shrink as players entered and left the game. IBM suggested a move to the mainframe.[3]

This might have seemed to be a huge sea change, but Teles had played games on a mainframe when he was a child visiting his father at a data processing facility in Brazil. He assured his programmers that the mainframe would be adequately powerful.

The Hoplon developers had to port their C code, but their *Java* code worked just fine. Then IBM suggested using IBM *Cell Broad-*

Two Perspectives

The "H" of this Hybrid Deployment

The IBM Cell B.E. is an accelerator extension to IBM's Power Architecture. Developed with Sony and Toshiba, the Cell B.E. was designed specifically to support the *high performance* demanded in gaming environments and other demanding workloads.

The "B" of this Hybrid Deployment

IBM's mainframe is born and bred to support *business*. It is architected for multi-tenancy and has the points of control to segregate and manage the resources allocated to each workload. Teles knew that mainframe-style security would be essential in his commercial space, where hacking is a major concern. Identity management, authentication, logging and the systemic ruggedness to support persistence were also important. All are well supported on System z, even with Linux, rather than z/OS, as the operating system.

[1] For a different perspective on different approaches to achieving the objectives of a grid architecture, see the issue of **Clipper Notes** dated May 21, 2007, entitled *All Nodes Are Not Created Equal - Thinking Differently About the Grid Nodes* and available at http://www.clipper.com/research/TCG2007064.pdf.

[2] For more about the commonalities of SOA and Grid, see the issue of **Clipper Notes** entitled *Multiplexing the Data Center with SOA and Grid*, dated April 25, 2007, and available at http://www.clipper.com/research/TCG2007055.pdf.

[3] For more on System z control points and security, see **The Clipper Group Navigator** entitled *IBM System z Security Covers the Enterprise End to End*, dated April 18, 2007, and available at http://www.clipper.com/research/TCG2007051.pdf.

band Engines[4] in an IBM *BladeCenter* form factor to offload the heavy lifting of the simulation workloads. With that in mind, the developers started coming up with new technical approaches that would not have been possible without a hybrid of specially-optimized processors. (See *Infrastructure Details*, below). IBM made further suggestions. The possibilities seemed almost infinite.

Today, Hoplon is running all gaming workloads on the mainframe. They will include the cell processor elements as they move to add more players in their second round of beta testing. The hosted mainframe environment allowed them to put less money into hardware and was more flexible. The *Hipersockets* internal in-memory network supports a grid within System z very well.

At present, IBM has offered *pay-by-use* terms that permitted them to get the income from gamers before paying IBM. The game runs on the same mainframe that houses all of IBM's retirement funds in Brazil. Teles sees the proximity of teenagers playing games (an audience with a high hacker population) and IBM's retirement funds as a positive sign of their confidence in the mainframe security.

Infrastructure Details

At first iteration, Cell B.E. blades will be clustered in a grid configuration with the Mainframe but not integrated into it. All elements can call each other in a service-oriented architecture. Linux provides one commonality between both environments, running on the Cell processors and in virtual *machines in the mainframe. Hoplon's bitVerse* middleware provides another and will be the place at which the integration of the two environments occurs.

It is hosted on System z, which coordinates the elements of the game. Teles hopes to integrate bitVerse with *z/VM*[5] so it can spawn and kill instances automatically, as needed, without administrative invocation. When Hoplon goes into their second open beta, they will need that automation. Teles values *DB2*'s *integration into WebSphere and Tivoli, whose identity management (TIM*[6]*) and access management (TAM*[7]*)* are critical to multi-player environments. He feels the tight integration takes many complications out of the operations process. He also sees many needs for integration with components responsible for the scale, deployment, and security capabilities of *WebSphere XD.*

With the addition of Cell processors, there will be three kinds of environments, connected and coordinated by the bitVerse middleware: the simulations, the transactional environment, and the gamers' side of the system. Gamers interact with a separate, user-facing module – an outer face to the game. The *Outerface* acts as an additional security layer, effectively limiting what the user can see and do. It can only access and change elements that belong to the player. In this way, security is built into the middleware and into the system.

Game state is persisted on DB2 on Linux. Recently, Hoplon developed an overlaying distributed object structure by which each kind of service or module in the game has access to the attributes and methods of the objects, and only the objects, that they are permitted to use. This adds to the bitVerse middleware the control elements that make the game more inherently resilient. Because of the service-oriented architecture (SOA), gamers can move unhindered all over the universe. As the Hoplon *physics*[8] get richer, fewer gamers will be supported on a single cell – but with grid architecture, adding resources will be transparent to operations.

Business Model

Hoplon will host Taikodom using IBM's "On Demand" solution, allowing it to grow as needed to cater to any number of interested gamers. For Hoplon, a significant source of revenue comes from product placement within the game itself. Since a MMOC gamer is

[4] Developed by IBM, Sony Corporation, Sony Computer Entertainment, and Toshiba, the Cell/B.E. contains eight POWER processing elements, each with a large amount of local memory. The Cell processor is used in gaming and other hand held devices. It also is available in the blade form factor as the *BladeCenter QS20.*

[5] For more information about the latest release of z/VM see **The Clipper Group Navigator** entitled *Oh The Things You Can Do with z/VM 5.3*, dated February 28, 2007, and available at http://www.clipper.com/research/TCG2007030.pdf.

[6] *Tivoli Identity Management*.

[7] *Tivoli Access Management*.

[8] Hoplon uses the words *physics* and *dimensions* to refer to its simulation, as they are both graphic and bound by ecosystem laws.

explicitly identified at login, product displays and links to commercial real-world online offerings can be precisely targeted at a set of players of a certain age range or geography.[9] Consider how a hybrid grid of transactional and rendering engines permit fine-tuned marketing to be delivered smoothly in highly relevant contexts.

Hoplon will capture user reaction in an amusing and universe-congruent way and will provide feedback to advertisers. It will also reap revenue from pay-to-play options. In future versions, access to the game will be offered on PCs, TVs, cell phones, and many other devices.

Relevance to the Enterprise

Consider the Taikodom environment not as just a very cool game but as something that supports interactions in a specialized, fully-realized context. If you are an enterprise, this may be exactly what your stakeholders are demanding. They may not want the immersive graphics, but they might need medical imaging, CAD capabilities, or analytic tools. That each player in a MMOG can be supported with specific attributes and capabilities may lead you to take a fresh look at how you support the workers in your enterprise.

The now-pervasive evidence of business process, gathered through sensors, click-through data, usage monitoring and even surveillance, supports multi-dimensional modeling of the enterprise. Proper visualization – not of space ships and aliens – but of the multi-variable analysis can support tactical consideration of a product enhancement or market opportunity. Tarquinio Teles sees a similarity to the enriched simulations used in oil and gas industries and in life sciences. In both cases, there is a need for scientists to watch simulations together in order to plan what opportunities to pursue with actual explorations. He hopes his bitVerse middleware will do well as enterprises consider what kinds of business strategy a hybrid model could support.

Conclusion

Multi-player games are a case of an unestimable situation characterized by high variability. Every business faces this situation. If it is small and young, the future is daunting. If it is established, the path to new markets, while not disturbing incumbent sources of revenue, is just as precarious. A modeling that rivals the complexity of gaming spaces is needed to give them the agility that new businesses must foster to survive. Think about how a consideration of gaming architecture can help you hook your enterprise more firmly to the reality that it faces every day.

With open standards and a service-oriented architecture to link them, the combination of Cell Processor blades and System z offers a tantalizing best of both worlds in the form of a heterogeneous (hybrid) grid. ***It is time to consider the benefits of different kinds of hybrid computing!*** How could this approach satisfy your particular kinds of extreme requirements?

[9] Brazil's laws on privacy forbid use of an individual's customer data. Customer data may only be used in the aggregate.

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