Online Gaming – Growth, Opportunity & Challenges Ahead

New players, new markets, new products

According to predictions from IHS Markit Technology analyst Piers Harding-Rolls the overall gaming market will have a focus on cloud gaming, next generation consoles, VR, mobile and subscription monetization. In 2019 the overall console market declined by 2.5% while companies are focused on transitioning to global gaming services and the revenue associated with the subscription models.

At the same time, PC- and console-based gaming continues to grow in popularity. A significant factor is the emergence Massively Multiplayer Online Games (MMOG) where millions of gamers compete against each other in real time, participating in virtual economies and trading in virtual currencies. MMOGs are not limited to amateurs. eSports is a major professional sports category that draws tens of millions of paid spectators each year. League of Legends (Riot Games), one of the largest eSports, has 100 million monthly active users and is estimated to reach 120 million monthly in 2020.

Technology innovations such as Gaming as a Service (GaaS), virtual and augmented reality, and the increasing availability of online streaming media platforms such as Twitch (acquired by Amazon), have become major factors contributing to the growth and changing nature of the gaming industry.

"Online gaming and social activities represent one of the fastest growing Internet business sectors in Asia and the world."

Ethan Wang, *Gartner Analyst: Future of Money: Virtual Money Drives Rapid Growth in Online Gaming*

New business challenges: Fraud protection, regulatory compliance and profitability pressures

The threat of malicious activity is growing, particularly in online gaming where fraudulent transactions can translate to millions of dollars in losses. With more players, more bets, and more financial transactions, the stakes have never been higher. To stay ahead of online thieves, game developers must continuously add increasingly sophisticated fraud detection rules and algorithms to their applications.

An evolving regulatory climate presents an additional set of challenges. Although online gaming has a global audience, the laws governing licensing and legal activities vary widely by region, country, and state jurisdictions. For application development teams, this requires an

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ability to quickly adapt features, rules, and controls, as well as tracking and reporting capabilities in order to comply with a myriad of laws pertaining to legality, privacy, and security.

Against this backdrop, sustaining revenue growth is becoming increasingly difficult for gaming providers. Competition is intensifying among established companies, start-ups, and independent developers. Many companies entice new customers with "play-for-free" offerings partially subsidized by ad revenue, in the hopes of transitioning them to more lucrative "pay-to-play" games.

To maintain existing revenue streams and create new revenue sources, gaming companies are making sizable, ongoing investments in product development and technology infrastructure. These escalating operating and capital expenses are essential to retaining customers, acquiring new customers, and offering new products and features that customers will pay for.

## Technology Priorities for Game Developers & Architects

The fast-changing business landscape has a direct impact on application development teams and the deployment criteria they must apply to database technologies. New rules, new games, and higher stakes are altering technology priorities, with more emphasis than ever on scalable performance, flexibility, and reliability.
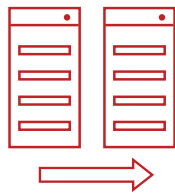
Ability to Scale Out – Gaming and online betting applications require the ability to store, manage and retrieve massive volumes of player profile information, game performance data, statistics and rankings, session data, and other types of data generated by millions of users. The ability to scale to meet fluctuating capacity demands and handle peak loads is particularly important because gaming tends to be event-driven. It is problematic to use relational databases for this use case, because they are designed to scale vertically, but not horizontally. The data volumes generated by gaming and online betting require the ability to easily scale out, without extensive manual intervention and coding.

Processing Speed & Low Latency – Instant response time is mandatory for any gaming application. Sluggish system performance and latency can result in brand damage, customer abandonment, missed bets, lost game state, and lost revenue opportunities. Delivering processing speeds measured in milliseconds is an extremely difficult challenge in online gaming and betting applications. Millions of simultaneous, real-time player interactions, item acquisitions, micro-bets, settlements and re-use of proceeds, recalculation of odds, and sophisticated fraud detection rules generate huge numbers of reads and writes against massive data volumes.
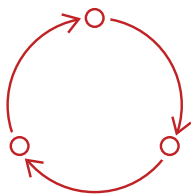
Rapid, Iterative Development – Game development teams are in a never-ending race to introduce new revenue-generating games and features to keep customers coming back and to stay ahead of the competition. Applications must also be continuously enhanced with updated rules engines for fraud detection, regulatory compliance, and other use cases. The days of twelve- to eighteen-month waterfall development cycles are long gone. Today's small teams work in agile sprints, iterating quickly and pushing code into production multiple times a day. Relational databases, with their rigid schemas and limited data types, are not designed to cope with the flexibility and agility challenges associated with modern gaming applications.
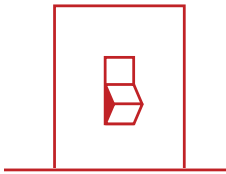
High Availability – Gaming consumers are not concerned with the fact that servers crash, networks go down, and power outages occur. They expect fast, reliable performance, 24/7. If the game goes down, brand is damaged and customers leave, often never returning. Gaming operators need to ensure that there is sufficient capacity, failover and redundancy capabilities across clusters and data centers so that if a system component fails, user experience is not impacted and data is not lost.

Cost-Effective Hardware Utilization – Expenditures on expensive, high-performance database servers are quickly declining as development teams move to distributed database systems that can run on low cost, cloud-based commodity servers. However, the advantages of less expensive hardware is largely offset by the need to constantly add more servers and more memory per server – a situation often referred to as "server sprawl." In addition to higher hardware costs, a sprawling server network introduces more complexity and risk of failure, which in turn translates to higher expenses for maintenance and for system administration staffing. These costs are augmented by higher development expenses fueled by the extreme pressure to rush new products and features to market.

Why Leading Gaming Companies Use Aerospike

Established, marquee gaming companies such as DraftKings, Curse and a steady stream of creative new market entrants are building their applications on Aerospike to meet today's requirements and future-proof their systems as their user communities get bigger and their offerings expand.

Speed at Scale – Gaming is among the most demanding database applications because of the sheer volume of data, transactions, and numbers of simultaneous users. Aerospike is designed from the ground up to achieve unrivaled speed at scale through a broad set of capabilities and unique innovations.

Automatic database sharding is a key capability in the Aerospike architecture that dramatically improves performance by distributing the database and the workload across multiple servers. Sharding occurs on the fly, in real time, with no manual intervention, and removes application-level sharding built into the code. Aerospike has pioneered a modernized architecture that takes advantage of memory in a way that has never been done before. Rather than using conventional file systems on top of the O/S block and file caches, Aerospike utilizes DRAM for the index and stores the data on SSDs treated as a raw block device. Aerospike's proprietary log structured file system is built to exploit the properties of Flash devices while eliminating issues associated with wear leveling, yielding superior and consistent performance and throughput. And unlike other NoSQL solutions, Aerospike is able to drive dozens of SSD devices per server before it becomes CPU-bound. Its parallelism is powerful, both within a node and across nodes; the best performance is achieved by scaling up on one node and scaling out across nodes using DRAM and Flash. Access is

optimized for the way in which Flash works – with small block reads and large block writes – and parallelized across multiple SSDs for better throughput.

Predictable Performance – Major betting events, e-game events, promotions, and other variables create unforeseeable peaks in gaming activity. Development teams need to be confident that the system always has the necessary capacity to handle any load at any time. Unlike relational databases, which are designed to scale vertically on a single server, Aerospike's distributed NoSQL architecture features the ability to scale up and scale out across servers, clusters, and data centers. Automatic scaling occurs in a linear fashion, ensuring that read and write performance is consistent and predictable, even during surges in betting and gaming activity.

High Availability – Aerospike's distributed "shared-nothing" architecture and patented algorithms reliably store data with automatic failover and provide replication at the server level to handle failures. By integrating these mechanisms with transaction processing, the system is highly resistant to common failures and is, to a great extent, self-managing. Automated load rebalancing, rolling upgrades, fault-tolerance, background backups and restores, and Cross Datacenter Replication (XDR) are all built into the Aerospike solution. With no single point of failure, game providers are protected from unplanned outages and can be confident their sites are always available to users.

Lower Total Cost of Ownership – A key advantage of Aerospike's unique "built for SSD" architecture is that it requires far less hardware than either conventional relational or NoSQL databases. For example, Aerospike enabled Sony Networks to deploy its gaming application using one-tenth the number of servers that would have benn needed with an alternative database. Dramatic reductions in hardware expenses are supplemented with similar savings in staffing costs associated with Aerospike's simplified architecture and built-in automation. DevOps teams are insulated from the common challenges of maintaining separate tiers for cache and persistent storage, and from separate databases for reads and writes. Automated database sharding and system self-management capabilities minimize the time and manual effort of daily system operations.

To learn more about how Aerospike can keep your gaming customers engaged and your development teams productive, visit us at www.aerospike.com/gaming/.