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System Profile of the Sony PlayStation

Dominic Arsenault

Development and release history

Sony had been working on a project that would eventually become the PlayStation as early as 1988. At the time, the company had a partnership with Nintendo in the form of licensed technology: Nintendo was using Sony's SPC-700 processor (designed by Ken Kutaragi) for the playback of sound and music in their upcoming Super Nintendo Entertainment System, to be released in 1990. The top video game company saw the rising CD-ROM technology as an opportunity to gain a technological advantage over its competitor Sega and match NEC's offering [1], which represented a growing threat to its market clout.

Nintendo and Sony reached an agreement where Sony would develop an add-on for Nintendo's Super NES which would use CD-ROMs (much like the Sega-CD that was added to the Genesis a few years later). In exchange for this, Nintendo would let Sony develop its own "Play Station" platform, a gaming and multimedia CD-ROM machine fitted with a port for SNES cartridges. Both the SNES-CD add-on and the Play Station console were to be announced at the 1989 Consumer Electronics Show. However, Nintendo somehow had not realized that the CD-ROM format to be used was under development by Sony, which meant the company would hold licensing rights over all games produced with its proprietary technology (it is unclear whether this was due to Nintendo not interpreting the contract correctly or because of subtle legal wording from Sony's part). Needless to say, this was in complete opposition to Nintendo's business practices of the time. Though Sony demonstrated their Play Station at the CES, the next day Nintendo announced that they would be working with Philips, Sony's rival in CD-ROM technology, to develop an add-on for the SNES. The leading video game company had inked a similar deal with Philips with one notable difference: Nintendo would hold the licensing rights to all CD-ROM games produced for the SNES.

Sony decided to keep working on their project and make their entry in the video game market. Since Nintendo still used their sound chip in the Super NES and had broken their contract by allying themselves with Philips, Sony managed to negotiate the right to keep the port for SNES cartridges on their console, although Nintendo would keep most of the profits from the games licensed. Sony unveiled its Play Station at the 1991 Tokyo International Electronics Show, with a scheduled release date in the summer of 1992 – six months before the launch of the SNES CD-ROM add-on. Then Nintendo broke off their agreement, Sony created the Sony Imagesoft subsidiary to develop and publish games for the Sega-CD and the SNES, and Nintendo slowly postponed and eventually

cancelled their CD-ROM add-on after observing the blunders of Sega and Philips' CD-based game consoles.

In 1993 Nintendo struck a deal with Silicon Graphics to develop a 64-bit console based on 3D graphics, essentially leapfrogging the 32-bit CD-ROM hardware generation. As the industry was reaching the end of its current life cycle that had started with the release of the Sega Genesis, Sony decided to wait for the next cycle to make their entry in the market. The Play Station was completely redesigned and the SNES cartridge port removed, and Sony's PlayStation was released to consumers on December 3, 1994 in Japan, and September and November 1995 in the rest of the world. The Sega Saturn, released in November 1994 in Japan, outsold the PlayStation for the first six months. Sega attempted to gain a head start over it with a surprise United States launch in May 1995, but lack of third-party support and software production delays resulted in a drought of games that nullified this timing edge. By contrast, the PlayStation's excellent selection of launch titles and large stable of third-party developers provided ample opportunities of showcasing the system's strengths. It also retailed for $299 in the U.S., $100 less than the Saturn. By the time Nintendo released their next console in June 1996 in Japan, the PlayStation had already attracted many gamers and game makers alike.

The PlayStation conquered the world of gaming and ended Nintendo's decade of dominance over the home video game consoles market. By December 1999, Sony had sold 70 million units, compared to a meager 28.7 million Nintendo 64s (*Business Week*, December 27, 1999, Number 3661, p.62). Nintendo survived thanks to its amassed wealth from the past and its Game Boy's monopoly over the handheld market, which accounted for 31% of the total market share for video games (handhelds and consoles included). The winner of the 32- and 64-bit home consoles era is clear: at the dawn of the next hardware generation in 2000, the Sony Playstation held 34% of the market, almost twice as much as the Nintendo 64's 17.5% (*Advertising Age*, February 14, 2000, Volume 71, Number 7, p.17).

According to Sony's March 2006 figures, the company has shipped 102.49 million PlayStation units. The console was the first to break the 100 million mark in the home video game market, a feat that is, as of March 2007, only equaled by the PlayStation 2. Production has officially ended on March 23rd, 2006, after an unusually long 11-year production span. These figures are in part due to Sony's release in 2000 of a smaller, redesigned version called the PSOne, much as Nintendo's earlier "New NES" [2]. Contrary to Nintendo's failure, however, the PSOne successfully kept consumer interest in the aging PlayStation: it was a great success and outsold even Sony's own new PlayStation 2 for the first six months following its release. With the original hardware and the PSOne combined, Sony has produced PlayStation units for 11 years, an unusually long time for a home video game console.

Licensing terms

The system gained favor among game developers over the Nintendo 64 and Sega Saturn for a number of reasons. First, most of them were burned out by Nintendo's strict

licensing policies and found Sony's terms extremely attractive: according to Steve Kent, "Sony's licensing structure was built around a $10-per-game arrangement that included manufacturing disks, manuals, and packaging." (p.511) Second, they saw in CD-ROMs the double advantage of low production costs and increased storage capacity that multiplied their creative possibilities:

> Compared to the cost of pressing CDs, manufacturing cartridges for Project Reality [development codename for the upcoming Nintendo 64 console] would be prohibitively expensive. At the time, it cost more than $20 to manufacture an 8-megabyte cartridge, compared to less than $2 to press a 640-megabyte CD. And the additional storage space on CDs could be used for video clips, animations, audio files, music, and larger games. (Kent, p.511)

Finally, programming for the PlayStation was much easier than for the Sega Saturn, whose architecture was based around two processors. This proved to be a challenge for most programmers, and those who worked on Saturn projects ultimately seldom used the console's power to its fullest. This was especially true on the U.S. production side, as Sega's 4-month advance launch took developers by surprise and did not give them time to appropriately familiarize themselves with the system.

Games library

According to Sony's official March 2006 figures, the PlayStation is host to 7,888 titles which shipped a cumulative total of 961 million units to consumers worldwide. Like the NES and Super NES before it, the PlayStation's success is attributable to its vast library of high-profile games. Sony's system featured most of the biggest franchises and series of its time (with the exception of Nintendo's first-party *Zelda* and *Mario* titles), including *Grand Theft Auto*, *Madden NFL Football*, *Tony Hawk Pro Skater*, *Need for Speed*, *Tomb Raider*, and *Mortal Kombat*. While these games were also available for other systems (the Sega Saturn, Dreamcast, and Nintendo 64 in particular), Sony could also rely on a large number of exclusives which went on to become video game classics. Worthy of mention, among others, is the *Gran Turismo* series, whose first namesake entry became the PlayStation's best-selling game with over 10 million copies worldwide. Other exclusive series include *Legacy of Kain*, *Syphon Filter*, *Twisted Metal*, *Tekken*, and *WWF SmackDown*. *Crash Bandicoot*, developed by Naughty Dog, was published by Sony Computer Entertainment America and its character was used in Sony's marketing as a mascot to combat Sega's trademark hedgehog Sonic and Nintendo's Mario. *PaRappa the Rapper*, a game in which the player had to press certain buttons at the right time to make the character rap along to some music, helped popularize the genre known today as "rhythm games". The *Resident Evil* and *Silent Hill* series were born on Sony's console and spawned numerous sequels, eventually across many gaming platforms, along with movie adaptations.

Many franchises that originated elsewhere were either moved to or resurrected on the PlayStation. The most notable example of this is Squaresoft's iconic *Final Fantasy* series. The company's exclusive relationship with Nintendo was threatened both by the latter's content policies and decision to continue with cartridges in the CD-ROM era; Square wanted to develop more mature themes and on a higher-capacity storage media,

which were both possible by going with the Sony PlayStation. When Square released *Final Fantasy VII* in the U.S. in 1997, the game became a huge mainstream gaming success and redefined the Role-Playing Game genre, which up to now had been only a niche market outside Japan. Square thrived on the PlayStation platform with its eighth and ninth *Final Fantasy* installments following, *Chrono Cross* (the successor to the highly-praised *Chrono Trigger* that appeared on Nintendo's Super NES), and a spin-off game that would later become a series, *Final Fantasy Tactics*. Konami resurrected its *Metal Gear* franchise with the release of *Metal Gear Solid* exclusively on the PlayStation in 1998. It was the first release in the series since 1990, and it established the roots of the stealth-based action game genre with its 3D graphics and intricate storyline. Konami also brought its long-standing *Castlevania* series to the PlayStation with *Symphony of the Night*, a 2D platform game that ushered in the 3D era and redefined the nature of the series by emphasizing open-ended exploration, character development and item collection rather than the usual level-based progression. Capcom also joined the fray by releasing *Mega Man 8*, *Mega Man X4* and *Mega Man X5* on the PlayStation.

Without a doubt, the migration of well-known franchises towards the PlayStation seduced many gamers in adopting Sony's console. Another incentive was Sony's establishment in 1997 of a "Greatest Hits" selection in the U.S, which regrouped all titles that had sold a high number of copies and been on sale for more than a year.[3] "Greatest Hits" were repackaged with a different label and sold at a discounted price ($24.99 was suggested, but many retailers offered them for $19.99). This provided gamers with a selection of successful games at a more budget-conscious price point, and soon became an industry standard with Nintendo and Microsoft reproducing the concept with their "Player's Choice" and "Platinum Hits" titles.

Technical specifications

The Sony PlayStation is a 32-bit console, designed to compete against Sega's 32-bit Saturn (released a week and a half earlier in Japan) and the 64-bit Nintendo 64 (that would enter the market a year and a half later). It is generally considered less powerful than the Sega Saturn, but as it was a lot easier to program, the actual quality of most games on PlayStation was usually higher than on the Saturn. Similarly, while the Nintendo 64 had more raw processing power, the higher precision allowed by 64-bit processing was seldom required in 3D games, and ultimately did not compensate for the lack of storage space on the N64 cartridges when compared to the PlayStation's CD-ROMs. As such, while the theoretical power of Sony's console was lower than its competitors, it did not readily appear as an inferior console.

The PlayStation marks the beginning of "modchips" in video game consoles history. By soldering a "Modification Chip" into the system, gamers could bypass or alter Sony's program code for verifying disc authenticity or regional lockout. This allowed them to burn on a CD-R a copy of a game and play it on their console, or to play games belonging to a different commercial zone. Because of modchips, piracy for the PlayStation was widespread: people could rent games at their local video club and burn a copy for

themselves and their friends, and with the growing usage of the internet, games could be downloaded from dedicated websites or peer-to-peer networks by millions of users.

The PlayStation contains five separate components: a Central Processing Unit (CPU), a Graphics Processing Unit (GPU), a Sound Processing Unit (SPU), some onboard memory, and a CD-ROM drive. The CPU is a 32-bit chip manufactured by LSI Logic and running at 33.8688 MHz. It allows 30 Million Operations Per Second (MIPS), has a bus of 132 megabits per second, an instruction cache of 4KB and a data cache of 1KB. It also houses the Geometry Transformation Engine (GTE) and the Data Decompression Engine (DDE). The former serves as extra processing power for the calculation of 3D graphics: it can handle 66 MIPS, and render 360,000 "flat", or 180,000 light-sourced or texture-mapped, polygons per second. (Sony originally claimed the PlayStation could display 1,500,000 polygons per second, but this estimate was given without taking into account artificial intelligence processing and other operations that commonly limit the amount of resources that can be allocated to graphics in video games). The DDE's function is to decompress images and video files. It has been used extensively in games like *Final Fantasy VII* to playback high-quality, pre-rendered, cut-scenes. It operates at 80 MIPS and is compatible with the Motion JPEG and H.261 standards.

The Graphics Processing Unit (GPU) is responsible for drawing the 2D graphics on-screen (this includes the calculated 3D polygons). It supports a range of resolutions ranging from 256x224 to 640x480, 16.7 million colors at a 24-bit depth, and Gouraud shading and texture mapping. The Sound Processing Unit (SPU) features 24 channels at a sampling rate of 44,100Hz (the standard audio CD quality). The PlayStation's onboard memory consists in 2MB of Random Access Memory (RAM) with an extra MB dedicated to video processing and 512KB for sound. The operating system is allocated 512KB of Read-Only Memory (ROM).

The CD-ROM is a double-speed drive with a maximum data transfer rate of 300 KB per second. It is compatible with both the CD-DA (for playback of audio CDs) and the XA Mode 2 (for increased CD storage capacity) standards. The first production run of PlayStation units sported an interior design that caused the laser unit to slightly go off-balance after extended usage, preventing the correct reading of CD-ROMs. This was due to the laser unit being made of plastic and located too close to the power supply; overheating slightly distorted the plastic alloy and altered the beam's angle. Sony corrected this problem in subsequent manufacturing runs. [4]

Notes

[1] Sega's console, the Sega Genesis, is well-known in Europe and North America for its rivalry with Nintendo's NES and SNES. NEC's PC-Engine was released in Japan in 1987 and soon became very popular, outselling both Sega's Genesis (Mega Drive) and Nintendo's NES (Famicom). The PC-Engine CD-ROM add-on hit the Japanese market in 1988. The system was subsequently exported to North America in 1989 and Europe in 1990 under a different name: the TurboGrafx-16, with the Turbografx-CD soon following.

[2] See the *System Profile of the Nintendo Entertainment System* section of this book for more details.

[3] A list of Greatest Hits titles for the PlayStation, PlayStation 2, and PlayStation Portable systems can be consulted online @ http://en.wikipedia.org/wiki/List_of_Sony_Greatest_Hits_games. As noted therein, the standard for acceptance was 150,000 copies at first, but was raised to 250,000 later.

[4] Readers can find a detailed procedure to correct these laser problems online @ http://www.cyber-mag.com/station/laserPSX.htm (accessed March 30th, 2007).

Further reading

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