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17 January 2020

### Analysis of Video Game Development Industry

Game Development is an industry that is currently undergoing explosive growth. Between PC and Console games and the newer mobile gaming market, the sector cumulatively earned over 131 billion dollars (Lanier, 2019). This income overshadows the 43 billion dollars in revenue that the movie industry saw in the same year (Robb, 2018). The game industry comprises studios and publishers located worldwide, in contrast with the Hollywood-based film industry. Video game development encompasses many art and science disciplines, including music, 3D modeling, animation, software engineering, and physics. As a result, this industry attracts an incredibly diverse set of individuals of different educational and professional backgrounds. One such studio within this industry is Bethesda Game Studios.

Headquartered in Rockville, Maryland (Bass & Schreier, 2020), Bethesda Game Studios is the in-house development studio of Bethesda Softworks. Outside of Rockville, they also have three other studios in Dallas and Austin, Texas, and Montreal, Quebec (Bethesda Game Studios, n.d.). It is a large company, with over 400 employees as of 2018 (Takahashi, 2018). Bethesda Game Studios is primarily known for single-player, role-playing games. These games are massive in scope, with players interacting with many non-player characters and enemies across a vast play space. In 2020, Microsoft acquired Bethesda's parent company, Zenimax Media, for "\$7.5 billion in cash, marking its biggest video game purchase ever" (Bass & Schreier, 2020).

Bethesda Game Studios was founded as Bethesda Softworks in 1986, initially based in Bethesda, Maryland, as the game development arm of Media Technology, Ltd (Crowe, 2006). The studio came to be when founder Christopher Weaver helped create the first sports game with a realistic physics simulation, called *Gridiron!* (MIT News, 2019). They went on to make "the

highly successful Wayne Gretzky Hockey series and several award-winning games based on The Terminator license” (Crowe, 2006). After this point, Bethesda Softworks started work on the franchise which they would become most known for: they released the award-winning *The Elder Scrolls Arena* in 1994 and the equally acclaimed *The Elder Scrolls: Daggerfall* in 1996 (Crowe, 2006).

Coming off the *Elder Scrolls* games’ success, the studio’s fortune started to change for the worse. After *Daggerfall*, the studio published two spinoffs, *The Elder Scrolls Adventures: Redguard* and *An Elder Scrolls Legend: Battlespire*, to the franchise that did not sell nearly as well as it should have, causing the studio to come near bankruptcy. Bethesda’s executive producer, Todd Howard, recalled this in an interview with NoClip: “[*Redguard*] did very, very poorly for a lot of reasons. We made some bad decisions, we made some games that weren’t our best stuff, and the company really got very, very small” (Jayne & Martinez, 2018). Bethesda executives decided to split the company up to avoid further financial issues at this point in the company’s history. Bethesda Game Studios was founded and split from Bethesda Softworks, decided after Zenimax Media formed as a parent company to handle administrative work (Jayne & Martinez, 2018). Since this split, Bethesda Game Studios has focused on *The Elder Scrolls* franchise and the *Fallout* role-playing franchise. Zenimax Media has gone on to become a large scale publishing company in its own right, acquiring well-known studios such as “Id Software, the maker of Doom, one of the earliest first-person shooters, and Quake.” (Bass & Schreier, 2020).

MIT alumnus Christopher Weaver founded Bethesda Softworks almost by accident. While working in the television industry, Weaver was approached by a colleague who was developing a football video game who asked Weaver for his thoughts: “It was really very boring.

He put in the same inputs and got the same outputs,” he would later recall in a 2019 interview with MIT’s Comparative Media Studies/Writing department. Weaver and his colleague developed a physics engine to remedy this, and the result was *Gridiron!*. He later co-founded Zenimax Media with the current CEO, Robert Altman, in 1999 (Bass & Schreier, 2020). After his tenure at Bethesda and Zenimax Media, he returned to MIT to teach at the MIT Microphotonics Center and Comparative Media Studies/Writing (MIT News, 2019)

When talking about Bethesda Game Studios, the first name that comes to mind for many is Todd Howard. As he tells it, Howard learned about Bethesda Softworks after receiving a copy of their game *Wayne Gretzky Hockey 3* as a gift (Jayne & Martinez, 2018). Bethesda employed Howard after knocking on the studio’s door and asking for a job, much to the staff’s surprise (Jayne & Martinez, 2018). Having worked as a producer and project lead on many of Bethesda’s games, he would eventually become the game director for *The Elder Scrolls V: Skyrim*, one of the studio’s most successful titles (Sullentrop, 2016).

Of all the game franchises developed by Bethesda Game Studios, the most successful is *The Elder Scrolls* series (Sullentrop, 2016). Set on the fantasy world of Tamriel, these games put players into the first-person perspective of a character that they create from various races, roles, and classes. Players use swords, bows, and magic to fight enemies like bandits, trolls, or dragons. The most successful of these games is *The Elder Scrolls V: Skyrim*, which received critical acclaim and has sold over 30 million copies as of 2018 (Suellentrop, 2016).

Created by Interplay Entertainment in 1997, Bethesda Softworks purchased the *Fallout* franchise. to make an immediate follow up to *The Elder Scrolls 4: Oblivion*. (Jayne & Martinez, 2018). Bethesda began work on *Fallout 3* before the release of *Oblivion*, releasing the game in 2008. Similar to *The Elder Scrolls*, *Fallout* is a single-player role-playing game played from a

first-person perspective. Set in the post-nuclear United States in the distant future, players must navigate a wasteland while fighting mutants and other survivors with various firearms and makeshift weapons.

Given the scale and scope of their games, Bethesda's titles have a reputation for varying levels of bugs and glitches upon release. Despite this, their games are generally well-reviewed among critics. Charles Onyett's review of *Skyrim* highlights this well: "More serious glitches exist as well, [...] but given the overwhelming number of things *Skyrim* gets right, putting up with them is a small price to pay." (2011), giving the game a rating of 9.5 out of 10. The game design quality vastly outweighs the bugs' negative aspects, making people generally satisfied with their products.

Currently, there is a significant trend toward mobile gaming as a significant earner for many companies within the gaming industry. Interestingly, PC and console games' earnings were eclipsed by mobile games' revenues, with projected growth well into 2025. (Lainer, 2018). It appears that Bethesda Game Studios has taken notice of this, as in 2015, they published their first free-to-play mobile game, *Fallout Shelter*. According to analysts, this game's launch was a massive success for the studio, having earned over 100 million dollars as of 2019. (Yeh, 2019).

There are many jobs within the video game industry. Designers formulate the game's rules, levels, and mechanics, while artists create characters and items, animations, and visual effects. Programmers and engineers handle the game's code and implement tools to assist with the game's art and design workflow. These engineers often design game engines, which drive much of the lower-level code for the computer to handle graphics, physics, and sound to enable much more rapid development of games by other programmers. To manage all these various roles, producers set schedules and deadlines, manage personnel, and facilitate communication.

Within the broad field of game development, the job I am most interested in pursuing is a tools engineer. A tools engineer designs, modifies, and maintains software that developers use to make games. Among these tools are the game engines, which other programmers and developers use to create games. Additionally, they fabricate creative software in collaboration with artists and designers.

Given this job's highly technical nature, some education and experience are desirable to find a position in this role at a company. The first approach I will take is to pursue my bachelor's degree in computer science at CSU Monterey Bay. Due to the breadth of topics covered in this program, many core concepts required for a tools engineer are available to be learned. For example, CST 338: Software Design will teach about creating graphical interfaces for end-users and the principles of software development processes. Designing a graphical user interface is essential because the quality of a user interface in software can vastly improve usability and productivity for an employee. If UI elements are confusing to navigate, workers are left to figure out the program rather than continue with their work. This course also teaches the fundamental process of designing software from start to finish. This development cycle is principal for any software development role. Additionally, CST 370: Design and Analysis of Algorithms educates students on designing more efficient and performant algorithms, a skill that is essential for any intensive software, including games.

A key aspect of my education will be the elective course that I choose to take. Many colleges in the Cal State system offer courses in game development and graphics programming. Ideally, CSU Monterey Bay offers CST 325: Graphics Programming, which teaches students about simulating lights, physics, and 3D models, which is essential for game engines. Because of the importance of these concepts on the backend of video game technology, taking this course

will be invaluable for my own set of skills to work as a tools engineer.

It is also important outside of formal education to gain skills and experience independently to cultivate a comprehensive technical and practical understanding of game development software. Fortunately, there are many freely available development toolkits available for students and aspiring developers to use. Among these is the free and open-source Godot game engine. Due to its licensing's open nature, Godot can be studied at all levels of code, making it perfect to learn how a game development toolkit works on the backend (Dealessandri, 2020). One could contribute directly to Godot's development to build a resume of contributed code to share with future potential employers. As Godot developer states in a 2020 interview: "As a professional or as a game development company, you can just get in touch directly with core developers and participate in the program's growth." (Dealessandri).

As a tools engineer, it is vital to understand software development outside of the game design realm. The tools used by game developers are still, at their core, professional software. One strategy to take is to write software for the sake of personal development. Contributing to existing open-source projects is a good start for this purpose. Many projects have extensive logs of issues that need to be repaired within their codebase and allow developers to contribute their solutions through open source repositories on Github. Additionally, undertaking projects of my own will be massively beneficial to this end. Specifically, any kind of project that uses desktop-oriented languages will be an excellent experience to help with the job hunt.

As a proliferating industry, the technology used to make games is becoming more complex. As a result, there is a need for more talented engineers to create the tools for designers and artists to develop more extensive and complex games. Studios like Bethesda create massive worlds for players to explore using in-house technology, developed by in-house engineers over

many years. These engineers are all experts in the field who have likely undergone very similar educations as the kind that I am pursuing, and I am excited to plan my future career in this industry.

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