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Introduction:

Over the course of his 40-year career as a game developer, John Romero has continually maintained his image as one of the most prominent and influential figures in the world of gaming. From his humble start creating and porting games for the Apple II, to his revolutionary and industry-defining titles like *Wolfenstein 3D* and *Doom*, John Romero's work defined the gaming industry of the late 80's and 90's. Today, Romero is a leading voice for diversity and inclusion in STEM fields, while also sharing his *Principles for Programmers* at development conferences. In this biography, John Romero's background, development experience, and his *Principles for Programmers* will be analyzed to create a deeper understanding of his impact on software development for video games.

Background:

John Romero was born in Colorado Spring, Colorado and has an ethnic background that is compromised of Mexican, Yaqui, and Cherokee. Romero spent his youth in a very poor part of Tuscon, Arizona "where access to STEM was to the privileged" that he did have (Gorey, 2019). Romero says that "[he] didn't know what a chemistry set looked like, and [he] didn't even know what chemistry was" yet soon discovered his passion for programming when his parents bought him an Apple II Plus computer (Gorey, 2019). Inspired by classic arcade games like *Space Invades* and *Pac-Man*, Romero quickly began creating his own and released his first published game *Jumper,* a Donkey Kong clone, in 1983. Romero's early career in the game industry mostly focused around porting games from the Apple II to the Commodore 64 and was able to contribute to classic games like *Might and Magic II*. However, it wasn't until Romero, Adrian Carmack, and Tom Hall quit their jobs at Softdisk to create id Software that Romero's career really started to take off.

id Software:

For the next 5 and a half years at id Software, Romero worked at "turbo mode", creating over 28 published games in a small development team of only 10 people. The tight deadlines and long hours that Romero experienced working at id highly shaped his fundamental views of what makes a successful programmer. The success of Romero at id is

not only seen through the sales and legacies of his many games but through their contributions to the space of game development as a whole.

Commander Keen:

Commander Keen was released as a 3 part series in 1990 for DOS and tells the simple story of Commander Keen, a young astronaut, and his adventures through space (Gabel). *Commander Keen* was built from a tech demo called *Dangerous Dave in Copyright Infringement*, which was made to show Nintendo that the smooth sideways rendering of the *Mario* franchise could be replicated on PCs (Kushner, 2013). Even though Nintendo did not have interest in the game, the method that Carmack and Romero developed would go on to be known as "Adaptive Tile Refresh". This method utilizes a buffer that renders images outside of the boundaries of the screen so that when the player moves forward, the prerendered image is moved from the buffer on to the screen, resulting in a smooth transition (Kushner, 2013). While the "Adaptive Tile Refresh" would go on to be used in other classic games like *Duke Nukem*, the engine that *Commander Keen* was built on would go on to be one the first licensed game engines set the tone for id Software to license their future game engines.

Wolfenstein 3D:

Wolfenstein 3D is often regarded as the first real first-person-shooter (FPS) game and spawned one of the most popular video game genres of all time. *Wolfenstein 3D* places the player as an allied spy within a Nazi castle trying to shoot their way out. Romero and Carmack created an ingenious method known as "ray casting" that allowed them to create and render a 3D environment from a 2D plane that was able to circumvent the hardware limitations of the time (Johnson, 2013). Ray casting used a 2D map of a room, created a field of view from the perspective of the player, and then lengthened and shortened the textures to create an illusion of depth. Such a solution was revolutionary at the time as it allowed players to experience 3D graphics in a way that was so seamless, that few players were able to realize it was infact a 2D game. Just like id did with *Commander Keen*, the engine for *Wolfenstein 3D* would go on to be licensed to other studios to give developers the power of early 3D gameplay.

Doom:

If *Wolfenstein 3D* can be described as the "grandfather of 3D shooters", *Doom* was the game that brought 3D shooters to the masses and completely changed the world of games. Similar to *Wolfenstein 3D, Doom's* story is simply a very angry space marine known as "Doomguy" fighting off a demon invasion from Hell. Building upon *Wolfenstein 3D's* ray casting, "binary space partitioning" was used to divide spaces up into a binary tree that rendered spaces closer to the player's node first and would then prevent rendering of obscured nodes. This means that spaces that the player were unable to view, were not rendered, allowing ray casting to take on more complex environments like height, windows, and staircases (Johnson, 2013). On top of this, *Doom* included local network multiplayer through the DWANGO service that pioneered the network capabilities of the first online games. Much like previous titles, *Doom's* engine was available to other developers and even modders, creating one of the first major modding communities that is still even active today. While it was Cormac's strong programming skills that lead to such an advancement in their engines, it was Romero's design expertise and soft touch that allowed these features to be full explored in the *Doom* game. Romero believes that *Doom's* success came from how different it was from other games at the time. Rather than slowly build and experiment with features across multiple games, with *Doom*, "we just did everything at once" Romero said in a recent interview with the Irish Examiner (Jenning 2019).

Principles for Programmers:

Following his time developing games for id in the 90's, Romero shared his knowledge and views of development at the 2017 WeAreDevelopers Conference. The principles he shared are as followed:

1. **No prototypes** - No prototypes. Just make the game. Polish as you go.
2. **Fallbacks on load failure** - It's incredibly important that your game can always be run by your team.
3. **Simplify** - Keep your code absolutely simple. Keep looking at your functions and figure out how you can simplify further.
4. **Focus on tools** - Great tools help make great games. Spend as much time on tools as possible.
5. **Don't rely on testers** - We are our own best testing team and should never allow anyone else to experience bugs or see the game crash
6. **Fix bugs immediately** - As soon as you see a bug, you fix it. Do not continue on.
7. **Target less powerful systems** - Use a superior development system than your target.

8. **Don't write code for future projects** - Write your code for this game only - not for a future game.
9. **Write modular code** - Encapsulate functionality to ensure design consistency. This minimizes mistakes and saves design time.
10. **Transparent coding** - Try to code transparently. Tell your lead and peers exactly how you are going to solve your current task and get feedback and advice.
11. **Embrace differences in programmers** - Programming is a creative art form based in logic. Every programmer is different and will code differently. It's the output that matters. (Romero, 2017)

While many of these principles might have seemed strange in the 90's, the rigid and product-oriented approach that Romero used was what allowed his team to create such a large number of classic games in a short period of time. One might even say that Romero's principles almost seem like modern-day agile techniques that put the emphasis of programming on creating deliverable products and code that can be polished later on their life cycle. Romero clearly has always focused on finished products that matched his vision and the quality of the work he produces shows the result. However, it was the strive for perfection that caused a rift between him and Carmack that would eventually escalate to the point where Romero was forced to resign from id.

Current Roles Today:

Currently, Romero lives in Galway Ireland and has spoken to DUCSS about his experience as a developer and has given advice to prospective developers on how to progress in the industry. Romero was also a featured speaker at Inspurefest 2016 where he spoke about his difficult introduction into the STEM fields from his minority background, while also advocating for an expansion of STEM to STEAM to include the arts. 25 years after the initial release of *Doom*, Romero even has gone back and created his own "unofficial" 5th episode for the game for free. Even after all of these years, Romero still remains one of the most prominent and influential figures in the game development industry.

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