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CSCI-C 490, Game Programming  
Midterm Paper

The Game (Is Afoot)

The game I have chosen to delve into is one called *Warframe*. It is a massively multiplayer online first person shooter (MMOFPS), with solo, cooperative, and versus types of gameplay. It is distinctly a game in the science fiction genre, and the theme can best be described by the phrase “space ninjas with guns.”

The Itty Bitty Nitty Gritty

Though *Warframe* is available on multiple platforms including the Xbox One and the Playstation 4, the primary platform is the PC. Additionally, the game engine of *Warframe* is programmed using C++ and utilizes a number of different application programming interfaces (APIs) including D3D, OpenGL, PhysX, DirectSound, DirectInput, and Win32/GDI, and a version control system based on the Git platform called Perforce is also used. ([Source 1](http://www.digitalextremes.com/careers/postings/programming/programmers-gameplaygeneralistsoftware-engineer))

*Warframe* is pretty popular, too. With an infographic published in March of 2014 listing the number of registered players at roughly 7.8 million, it is listed as one of the top free-to-play games on both Steam and the second most download application on the Playstation 4. Another cool statistic is that it apparently has players located in every single country on earth. ([Source 2](https://warframe.com/news/warframe-numbers))

The Goal, a.k.a. The Answer to Life, the Universe, and Everything, a.k.a. 42

In *Warframe*, like most massively multiplayer online games (MMOs), there isn’t really a well-defined “end” to the game. Also like most MMOs, the ultimate goal is up to the player. Does the player only ever participate in player versus environment (PvE) gameplay? If so, is it solo or is it cooperative? How about player versus player (PvP) gameplay? Maybe both? While there isn’t a well-defined end to the game, there is one constant between PvE and PvP gameplay: equipment. When a player starts off, as usual in almost any game that requires a player to level up their equipment, they are very weak with only one class available to them, and have access to a couple different weapons. In order to be able to tackle harder and harder PvE and PvP content, the player must unlock additional classes and level said classes, along with his or her equipment and the modifications that allow customization. So in short, the specific goal of the game is to get the best classes, equipment, and modifications (mods), though to what extent is dictated by the player.

This overarching goal can be broken down in to different sub goals. For example, the game features a modular enhancement system for weapons, classes, and companions, where each mod has its own level. Every time the player levels up the mod it becomes more powerful, but also costs more points from the class’ mod pool. It can thus be considered a separate sub goal for each mod to get it to its maximum level, and there can be a sub sub goal of having duplicate mods at differing levels to enhance the customization available to a player’s classes, weapons, and items.

As an extension to this, another goal is to maximize the level of all equipment you own, thereby increasing something called a mastery rank, which is simply a sort of shorthand way to keep track of how advanced a player is, specifically how many classes, weapons and companions he or she has levelled, and how much of the game map they have completed. This mastery rank also serves as a gate for some weapons as they cannot be used by the player until they reach a certain rank, which is yet another goal.

Tokens and Objects and Characters, Oh My!

Non-player characters in *Warframe* are decidedly scarce, and generally not too “deep,” in that they don’t really have much, if any, backstory, personality, or other elements that invoke the player to care about them. The main exception (disclaimer: that I have found) is an AI companion named Ordis, which is embedded into and manages your ship and has myriad random lines of idle chatter while you are aboard. This ship also serves as your base of operations and has all the amenities a player familiar with such games would expect of such: special facilities for different types of item management; a forge facility to create new weapons, classes, cosmetic items, and consumables; mission navigation; information centers; companion management; and even a store.

Almost all games nowadays have some form of currency, and *Warframe* is no exception. This basic currency, credits, is utilized as a both a resource gate and a time sink by the game, as it is consumed in large quantities by a great many actions taken. For example, as explained earlier, to gain access to better weapons, a player must increase their mastery rank. And in order to increase their mastery rank, they must either purchase or craft more weapons. Because this crafting process is not free, a player must complete missions to gain credits. Additionally, this crafting process consumes not only the basic currency, but also varying degrees of other resources, from common enemy drops to rarer boss-only drops, requiring further “farming” as this process of resource gathering is called.

This aspect of farming brings an interesting question to the table, namely, “What if I (don’t have the time/am too impatient/don’t want) to do this?” The answer to that question lies in the game’s premium currency, called platinum. This currency allows a player with more money than time to both purchase what they want directly from the in game store, and to trade with other players for special items that are not in the store. It also allows one to purchase the aforementioned uncommon/rare resources without having to play through missions, and can additionally be used to speed up the production of an item in the player’s crafting facility. While the inclusion of a premium currency in a game is viewed as detrimental by some, it can also be argued that without this premium currency, the game would not be free-to-play and therefore would have a much smaller player base. Platinum also has uses beyond the stereotypical “I want everything and I want it now,” namely those that could be classified as “ease of life.” Specifically, this includes things such as allowing a player to have more weapon slots or more class slots, which is highly beneficial as most of the different weapons and classes are better suited to different situations, and having the right tool for the job not only makes said job easier, it is also appreciated by teammates as it makes their lives easier.

Rules… So Many Rules

*Warframe* is quite complex, and thus has many rules governing it. The most obvious rule set in any digital game tends to be the operational rules, and this is no different for *Warframe*. The majority of the operational rules in the game revolve around restricting the player and their customization of equipment along with their access to missions. One specific example of an operational rule is that a player cannot access a mission unless he or she has completed a mission in an adjoining sector, the only exception to this being when a player gains access to a new mission tier (represented by planets), then one mission is automatically unlocked on the new tier. In the same vein, a player is restricted from accessing new tiers until the boss on the current tier has been defeated by said player. This all adds up to an additional time sink for the game, though it is rewarding for the player, in terms of resources gained, to go through the hassle of completing the necessary missions.

A major aspect of *Warframe* revolves around the customizing of equipment, and there are rules that apply there as well. Given that a player actually sees the numbers from applying mods, it can be argued that the rules governing mods are of both the operational and constitutive types. Operational due to being restricted from applying certain mods to certain pieces of equipment, applying a rifle mod to a pistol for example, and constitutive because the more the player tinkers with their equipment and mods, the more the underlying calculations become apparent, such as certain mods effecting weapon damage output in different ways.

Because *Warframe* is, at its core, a combat game, a player is constantly running around different missions dispatching enemies and this is truly where the bulk of the constitutive rule set comes into play. This is the underlying math, from the physics of jumping, to the damage received by both players and enemies, to the activation and use of the different class abilities. Expanding upon the class abilities, there are four different stats that can be altered by mods: duration, efficiency, range, and power. Duration controls how long an ability is active, efficiency controls how much energy an ability takes to activate, range modifies the distance an ability effect covers, and power deals with the strength of an ability. Each of these stats is actually a percentage that is dependent on the base ability stats, so a modifier of +30% to range doesn’t simply add 30% of some arbitrary range, it adds 30% to the base ability, that is +30% range on an ability of 10 meters would total 13 meters. Duration on the other hand, is a bit more complex. For an ability that is “fire-and-forget,” it just increases the duration time, but for an ability that is toggled on and off and continuously drains energy while in use, duration actually reduces the amount of energy consumed per time interval, thus effectively acting like a boost to the efficiency stat.

Beyond the operational and constitutive rule sets there lies the implicit rules. These aren’t rules that are set in stone in the game code, rather they are rules of social etiquette which are community-based and technically voluntary, though a player would likely get ignored and/or shunned for ignoring or willfully violating them. One such rule that is fairly universal throughout different MMOs is the “no begging” rule, which is as simple as it sounds. As a player it is pretty much considered anathema to beg for free stuff in community channels, and in some games it is actually a punishable offense usually dealt with by a swift forced ejection from the channel. On the flip side, it is completely ok and even encouraged to ask for help with a specific mission if a player finds that he or she can’t tackle it solo.

People are Weird

Being that *Warframe* is an MMO, it follows that social interaction is a key part of the game. Indeed, high level end game content simply cannot be taken on solo. However, in *Warframe* this social interaction isn’t actually required in all things, by virtue of the automated matching system that is available for all regular missions. On the other hand, if a player wishes to sell something they have found or buy something they need from another player, social interaction is simply unavoidable. By and large though, this is constrained to haggling for prices or items for trade in return for other items.

The larger context of social interaction resides in places other than the trade channel, such the region channel or the game’s forums. In the region channel, for the most part a player will find the usual chatter, ranging anywhere from anything relating to the game to the most outlandish topics possible. From my own personal observations however, things mostly stay fairly calm and reasonable, with only the occasional excrement flinging contest rearing its ugly head.

So Long, and Thanks for All the Fish

All in all, *Warframe* is a massively complex game all the way from the theoretical aspects of game design to the actual implementation and playability. So much so that all that was given here really only skims the surface in a broad way. As a player of said game, I can say that this complexity results in a very unique experience which is highly enjoyable.

Sources

Source 1:   
Programmer job posting on Digital Extremes’ website  
<http://www.digitalextremes.com/careers/postings/programming/programmers-gameplaygeneralistsoftware-engineer>

Source 2:   
News post “Warframe in Numbers” on the Warframe website  
<https://warframe.com/news/warframe-numbers>