

Quantifying the Performance of a GTX1070TI Graphics Card on A Range of Games.

Abstract

In order to display high quality images and video from a personal computer (PC), a graphics processing unit (GPU) is required. Video games are the ideal applications to test for video and images because they can range from having conservative to taxing demands for the GPU. I have selected the ASUS ROG Strix GTX 1070ti GPU to account for the range of games tested. The "frames per second" (FPS) was the key variable sought from each game while PC hardware and resolution acted as controls. The results convey a correlation between high FPS with low detailed games and lower FPS with detailed games.

Introduction

GPUs render images of a video (or image) individually as a frame/picture. In order to output a high number of frames (while maintaining a high resolution) from a game in real-time, a computationally powerful GPU is required.

Objective

In our experiment, we're documenting the FPS output from each game while maintaining a 1440p resolution with the highest settings. I have selected a group of games ranging from conservatively demanding to taxing. Since FPS can fluctuate depending on the circumstances in-game, it is essential to record a lowest and highest FPS from static and dynamic gameplay activity.

Materials

While the GPU, CPU and RAM are the vital components, other variables such as cooler type can effect performance and in turn effect framerate output. Therefore, I am outlining every component used for my PC as well as the monitor.

PC setup with the following components:

ASUS ROG Strix GTX 1070ti, AMD Ryzen 7 2700x, G. Skill Trident Z 16GB DDR4-3200, Corsair H100i PRO 75 CFM Liquid Cooler, MSI X470 GAMING PLUS ATX AM4 Motherboard, Samsung 860 Evo 1 TB 2.5" Solid State Drive, EVGA SuperNOVA G3 750 W 80+ Gold Power Supply, Asus ROG SWIFT PG278QR Monitor, and Windows 10 OS [1].

I have selected 10 benchmark games to quantify performance and set everything to "Ultra" settings.

Procedure

1. Turn on PC setup with Windows 10 OS and the 10 listed games (see table 1) installed.
2. Boot up first game to test and simply note the FPS (usually 60 FPS on the top right of the screen) at the main menu of the game is constant. This is to ensure the game is running properly.
3. Start a "New Game" for the game and locate any static environment (with minimal moving parts) and document FPS displayed. This is your highest FPS.
4. Experiment inside the game environment by manipulating the physics and particles in game while generating as much movement as possible, note down the FPS displayed. This will be your lowest FPS.
5. You now have your highest and lowest FPS recorded.
6. Calculate the average FPS by dividing the sum of the highest and lowest FPS by 2.
7. Repeat steps 2-6 for each game and record.
8. Chart results in a table and graph (see table 1, figure 1 and figure 2).

define what is considered minimal

Results

Table 1. Highest, lowest, and average FPS of each game.

Game @ 1440p "Ultra"	Highest FPS	Lowest FPS	Average FPS
Minecraft	360	380	370
Overwatch	120	130	125
Destiny 2	80	100	90
Mirror's Edge	68	84	76
DMCV	65	81	73
Control*	59	63	61
Dark Souls 3	60	60	60
Nier	60	60	60
Automata			
Sekiro	60	60	60
Tekken 7	60	60	60

good procedure

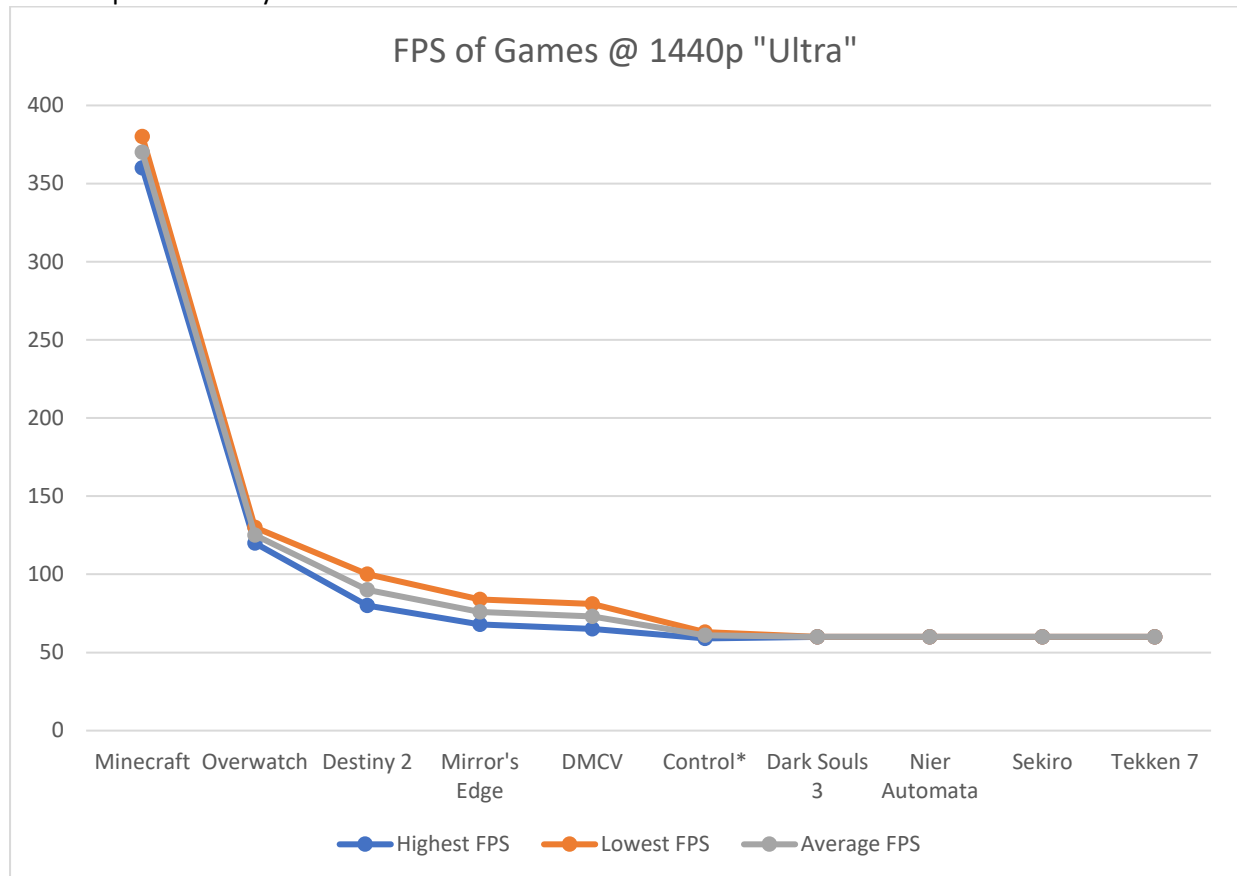


Figure 1. Line graph of highest, lowest, and average FPS of each game.

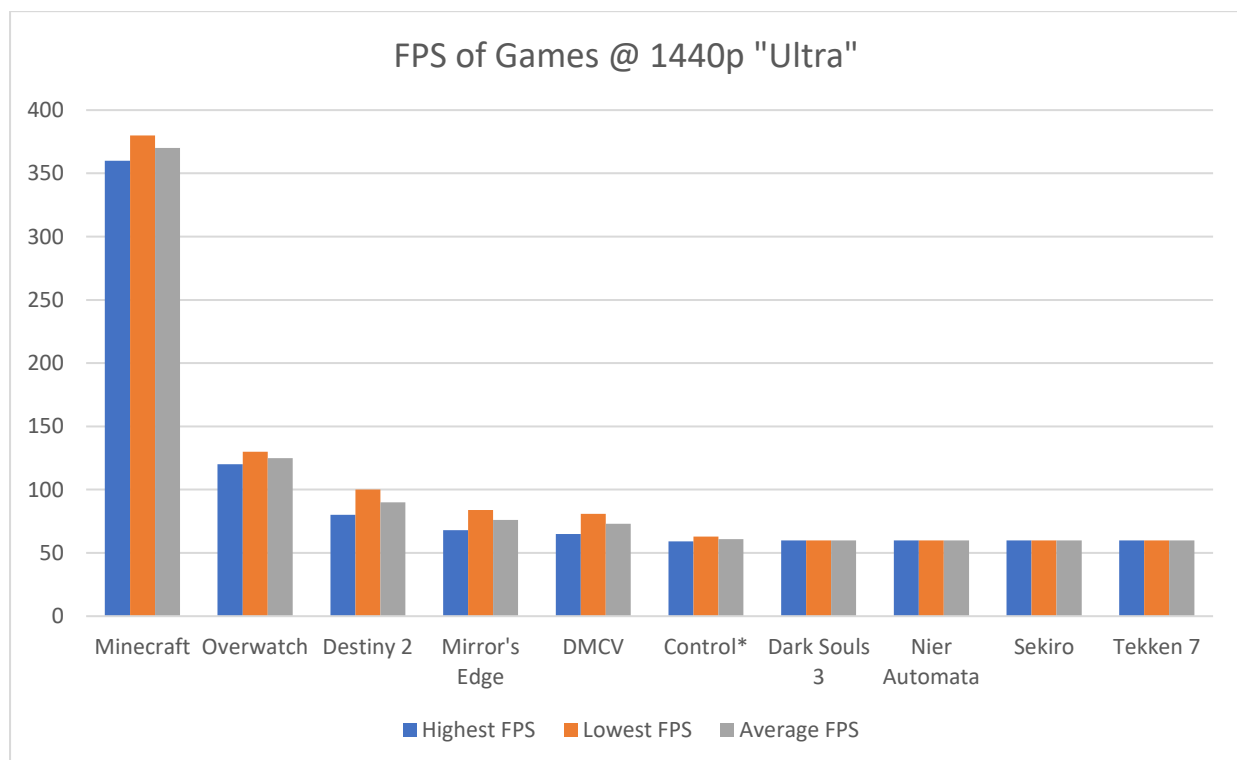


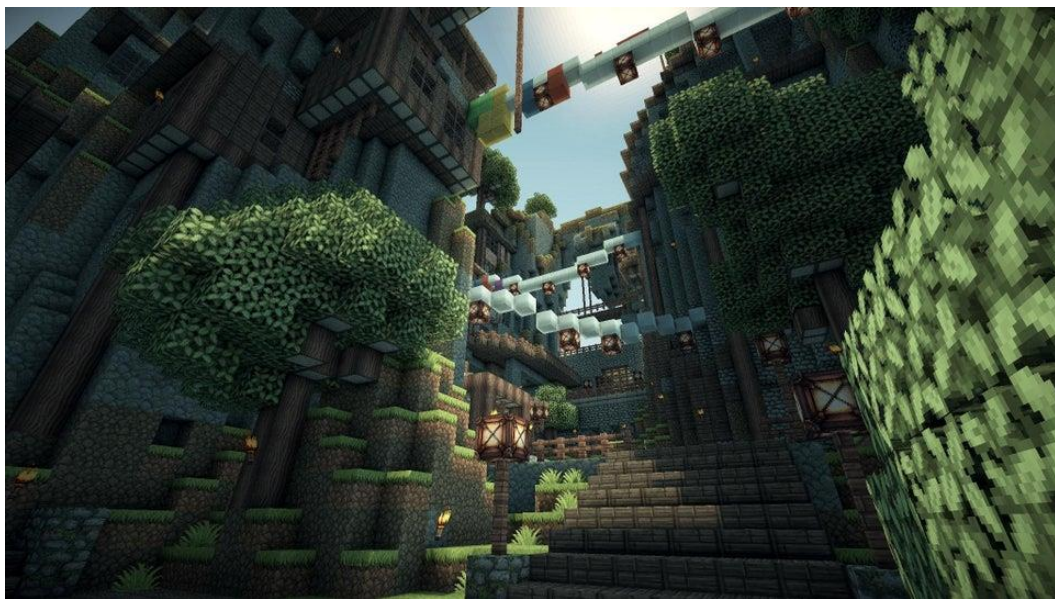
Figure 2. Column of highest, lowest, and average FPS of each game.

nice graphs

Analysis

While it is difficult to pinpoint measurement due to fluctuating framerates during volatile gameplay, one can conclude a general framerate output from a GPU by doing the above experiment. Controlling for resolution and hardware while testing for frame rate in various environments will yield an average FPS. It is worthwhile to note that certain games have a capped off framerate due to developer intentions. It is also worthwhile to note that framerate is greatly affected by number of moving parts within the screen. As such, static environments will generally output a higher FPS than one with many moving particles. This is why we recorded a highest and lowest FPS.

Overall, one can safely conclude that a game with a lower complexity of detail (Minecraft and Overwatch) will output a higher FPS than more complex and detailed games (Mirror's Edge Catalyst and so on).



caption
your
pictures

Reference List

[1] "System Builder." *PCPartPicker*, 2019. Accessed October 12, 2019.

<https://pcpartpicker.com/list/vLbXHB>

- This paper is well-written & is very interesting. The results are displayed really nicely. Just add a bit more background info if the audience has people who may not understand all the terms. - Suhaima

Audience Profile

- This is a good paper. You don't have much to fix, but you need to add more information to your intro.