Chris Hess

Kristian Gambuzza

Muhammed Alyan Khan

Term Group Practical Project Assignment Week # 1

Company Name and profile- **Menacing Max Wynn** Game Development Studio in NYC)

Location: New York City, NY, USA

Type of Business: PC Game Designer

Japanese-Style Horror Role Playing Games (JRPG’s)

Games Only

Online presence: Yes: websites and social media platforms.

Audience: JRPG enthusiasts, HIgh-school/College Age Video Game Players

Who We Are:

We are a video game company on a quest to create the perfect JRPG Horror game. We aim to create a fun yet horrifying match you can only play once. We will have achieved our goal if our players never want to play our game but spread it to their friends and family to share in the misery (like the movie The Ring).

Beginnings:

It started in 2022 after M. Khan discovered his first Japanese RPG horror game in his freshman year of college. Immediately falling in love with the style and story, he decided to get into programming to make his own: the following year, Mr. Khan met K. Gambuzza, whom he introduced to the world of JRPG horror games. Having loved his experience, Mr.Gambuzza decided to join Mr. Khan in making the perfect JRPG Horror. Finally, the pair meet C. Hess. He joined the company because he was bored and needed internship credit. Mr. Hess liked Messrs Khan and Gambuzza, so he decided to stick around.

Business Activities:

Max Wynn develops, markets, and publishes video games for the Japanese Horror Role-Playing Game audience at Menacing. While we are working at the national level, we hope to expand to the genre's origin and other regions and dialects. We are exploring the video game industry's platform evolution to ensure we can reach as many people worldwide as possible.

One of the main reasons our company stands apart is that we love the genre and style. We supplement our passion with quarterly in-house training and stay current with industry trends through participation in various organizations, such as the IEEE, DiGRA, and the ESA.

Qualifications:

We require that our employees attain at least a bachelor's degree in their field or the equivalent certification from an industry professional organization.

The Team So Far:

Muhammad A. Khan: CEO and Game Director

Kristian Gambuzza: CTO and Lead Programmer

Chris Hess: CIO and Lead Designer

We are the **Menacing Max Wynn** PC Game Development Studio in NYC, LLC. Located in New York City, NY, USA with three members

SYSTEM CPU PROPOSALS

|  | SYSTEM A | SYSTEM B |
| --- | --- | --- |
| CPU | Intel® Core™ i9 processor 14900k | AMD Ryzen™ Threadripper™ PRO 7995WX |
| Specifications | <https://www.intel.com/content/www/us/en/products/sku/236773/intel-core-i9-processor-14900k-36m-cache-up-to-6-00-ghz/specifications.html> | <https://www.amd.com/en/product/13841> |
| MOTHERBOARD | ASUS ROG MAXIMUS Z790 FORMULA LGA 1700 | Pro WS WRX90E-SAGE SE |
| Specifications | <https://www.newegg.com/asus-rog-maximus-z790-formula/p/N82E16813119658?nm_mc=AFC-RAN-COM&cm_mmc=afc-ran-com-_-GameRant&utm_medium=affiliate&utm_campaign=afc-ran-com-_-GameRant&utm_source=afc-GameRant&AFFID=3988123&AFFNAME=GameRant&ACRID=1&ASUBID=UUgrUeUpU2133827&ASID=&ranMID=44583&ranEAID=3988123&ranSiteID=5m68_Cu7Bq4-aRS4gEaADdlNlcgLT8gKyA> | <https://www.asus.com/motherboards-components/motherboards/workstation/pro-ws-wrx90e-sage-se/techspec/> |
| RAM | VENGEANCE RGB DDR5 RAM 64GB (2x32GB) 6400MHz CL32 Intel XMP (CMH64GX5M2B6400C32) | 8 of :  KSM48R40BD4TMM-64HMR  64GB DDR5 4800MT/s ECC Registered DIMM |
| Specifications | <https://www.corsair.com/us/en/p/memory/cmh64gx5m2b6000c40/vengeance-rgb-64gb-2x32gb-ddr5-dram-6000mhz-c40-memory-kit-black-cmh64gx5m2b6000c40#tab-techspecs> | <https://www.kingston.com/datasheets/KSM48R40BD4TMM-64HMR.pdf> |

|  | SYSTEM A (INTEL CPU) |
| --- | --- |
| GPU | NVIDIA Quadro P4000 |
| Specifications |  |
| Hard Drives | **BarraCuda 3.5" Hard Drive 8TB** |
| Specifications | [Data Sheet (seagate.com)](https://www.seagate.com/content/dam/seagate/migrated-assets/www-content/datasheets/pdfs/3-5-barracudaDS1900-14-2007US-en_US.pdf) Here listed are all the specifications for this specific HardDrive. |
| Monitors | **ASUS ROG Swift PG279QZ** |
| Specifications | Panel Size (inch) : 27  Aspect Ratio : 16:9  Color Space (sRGB) :99%  Panel Type : IPS  True Resolution : 2560x1440  Display Viewing Area (HxV) : 596.74 x 335.66 mm  Display Surface : Non-Glare  Pixel Pitch : 0.233mm  Brightness (Typ.) : 350cd/㎡  Contrast Ratio (Typ.) : 1000:1  Viewing Angle (CR≧10) : 178°/ 178°  Response Time : 4ms(GTG)  Display Colors : 16.7M  Flicker free : Yes  Refresh Rate (max) : 165Hz  More specifications: [ROG SWIFT PG279QZ | Monitors | ROG Global (asus.com)](https://rog.asus.com/monitors/27-to-31-5-inches/rog-swift-pg279qz-model/spec/) |
| Mice | Logitech Signature M650 |
| Specifications | More specifications: [Logitech M650 Wireless Mice - Small, Large, Left Handed Mouse](https://www.logitech.com/en-us/products/mice/m650-signature-wireless-mouse.html?irclickid=RUcQw4zXQxyNWyJxyiSAh2UGUkHRRNSgESBLyM0&utm_source=radius&utm_medium=affiliate&irgwc=1) |
| Keyboard | **RGB Mechanical Gaming Keyboard AW410K** |
| Specifications | [Alienware RGB Dark Side of the Moon Mechanical Gaming Keyboard & Gaming Mouse - AW410K & AW610M : Gaming Accessories, Keyboards & Mice | Dell USA](https://www.dell.com/en-us/shop/alienware-rgb-dark-side-of-the-moon-mechanical-gaming-keyboard-gaming-mouse-aw410k-aw610m/apd/486-bbfx/gaming-gaming-accessories?gacd=9684992-1119-5763017-266598158-0&dgc=ST&SA360CID=71700000109625073&gclid=7e7e14526b821c35febc725e09f1fe3e&gclsrc=3p.ds&msclkid=7e7e14526b821c35febc725e09f1fe3e#overview_section) |

|  | SYSTEM B (AMD CPU) |
| --- | --- |
| GPU | AMD Radeon™ PRO W7900 |
| Specifications | <https://www.amd.com/system/files/documents/232010504-b-radeon-pro-w7900-datasheet.pdf> |
| Hard Drives | <https://www.techpowerup.com/forums/threads/pcie-5-0-m-2-ssds.318294/> |
| Specifications |  |
| Monitors | BenQ 32" (31.5" Viewable) 60 Hz IPS UHD Monitor 5 ms 3840 x 2160 (4K) HDMI, DisplayPort, Thunderbolt 3, USB, Headphone PD3220U |
| Specifications | **Model**  Brand BenQ  Mode PD3220U  Cabinet Color Black  **Display**  Screen Size 32" (31.5" Viewable)  Glare Screen Anti-glare  Widescreen Yes  Recommended Resolution 3840 x 2160 (4K)  Refresh Rate 60 Hz  Viewing Angle 178° (H) / 178° (V)  Display Colors 1.07 Billion  Brightness 250nits (typ.), 300nits (peak)(HDR)  Contrast Ratio 1,000:1  Aspect Ratio 16:9  Response Time 5 ms  Panel IPS  Display Type UHD  **Connectivity**  Connectors HDMI, DisplayPort, Thunderbolt 3, USB, Headphone  HDMI 2 x HDMI 2.0  Thunderbolt 3 1 x Thunderbolt 3 (PowerDelivery 85W, DisplayPort Alt Mode, Data)  DisplayPort 1 x DisplayPort 1.4  USB 3.0 1 x USB Type B (Upstream)  1 x USB C (Downstream)  3 x USB 3.1 (Downstream)  Headphone 1  **Power**  Power Supply 100-240 VAC  Power Consumption Power Consumption (normal): 37W  Power Consumption (max): 220W  Power Consumption (sleep mode): <0.5W  **Convenience**  Stand Adjustments Tilt (down/up): -5° - 20°  Swivel (left/right): 30°/30°  Pivot: 90°  Height Adjustment Stand: 150mm  Built-in Speakers 2W x 2  HDCP Support Yes  VESA Compatibility - Mountable 100 x 100mm  **Features**  Features 100% Rec.709, 100% sRGB, 95% P3  HDR10  Flicker-free Technology  Low Blue Light  Delta E <= 3 (avg)  **Dimensions & Weight**  Dimensions (H x W x D) 18.80"-24.70" x 28.10" x 10.80" w/ stand  16.20" x 28.10" x 3.40" w/o stand  Weight 23.60 lbs. w/ stand  17.40 lbs. w/ stand  Packaging  Package Contents Power Cable (1.8m)  HDMI 2.0 Cable  mDP to DP Cable  Thunderbolt 3 Cable  USB 3.0 Cable |
| Mice | V7 MU200-1N Black 4 Buttons 1 x Wheel USB Wired Optical 1600 dpi Low Profile Mouse  <https://www.newegg.com/v7-mu200-1n/p/N82E16826575036> |
| Specifications | **Model**  Brand V7  Model MU200-1N  Type Wired  **Details**  Interface USB  Tracking Method Optical  Buttons 4  Scrolling Capability 1 x Wheel  Color Black  Maximum dpi 1600 dpi  **OS / System Requirement**  Operating System Supported Windows XP, Windows 7, Windows 8, Windows 10  **Features**  Comfortable, low profile design  Optical sensors provide precise and swift cursor movement  4-Button with 2 adjustable dpi settings 1000 & 1600 dpi  Plug and Play confidence with USB wired connection reliability  Ambidextrous design for comfort in either hand |
| Keyboard | <https://www.newegg.com/kensington-pro-fit-k75400us-usb-wired/p/N82E16823155080?Item=9SIAD6HAN84067> |
| Specifications | **Model**  Brand Kensington  Name Pro Fit  Model K75400US  **Keyboard**  Keyboard Interface USB  Design Style Ergonomic  Palm Rest Integrated  Keyboard Color Black  Type Wired  **Features** Ergonomist-approved design positions your hand for improved comfort.  Built-in wrist rest and neutral grip supports, cushions, and positions the wrist for comfort and neutral hand alignment.  Built-in wrist rest supports, cushions, and cradles the wrists.  Quiet keys mean typing is smooth, easy, and non-disruptive.  Spill-proof keys make cleanup fast and easy.  Caps Lock, Numbers Lock, Scroll Lock, and F-Keys are popular features that make typing and navigating easier and more efficient.  Plug & play USB connection is simple and reliable. |

CPU REVIEWS SYSTEM B (AMD)

In nearly every benchmark and test performed using multi-threading, which utilized many cores, the CPU outperformed the competition by a large margin. However, it fared on par with the rest of the CPUs tested using single-core processing. The review stated that the software would have to be created to take advantage of the high number of cores.

<https://www.notebookcheck.net/AMD-Ryzen-Threadripper-PRO-7995WX-Processor-Benchmarks-and-Specs.796971.0.html>

In this review, the author states that the CPU performance is top-of-the-line and would be of great use to anyone using creative/creation tools and software. The CPU was the top performer in every 3D rendering test, and calculating computational fluid dynamics completely blew the competition out of the water. The only glaring area where the CPU was not outperforming everyone else was in machine learning and Artificial Intelligence applications. However, that is a non-issue for our project's use case.

<https://www.phoronix.com/review/amd-linux-threadripper-pro-7995wx/11>

This review again showed that the CPU is a performance titan. However, it reinforces a point from the previous review that performance can depend on the software. While still within the top 5 performers on the tests performed, the reviewers noted that many programs used simply do not take advantage of cores past a certain amount.

<https://www.pugetsystems.com/labs/articles/amd-ryzen-threadripper-pro-7000-wx-series-content-creation-review/#How_good_are_the_AMD_Ryzen_Threadripper_PRO_7000_WX-Series_of_processors_for_content_creation>

Puget Systems review:

This review summarizes the AMD CPU as extremely powerful in CPU-intensive tasks. The AMD CPU series was tested against the Intel series CPUs, and other than the benchmarks tested in Adobe software, it took the top 1-3 spots of all the other benchmark software. In almost all the tests, the CPU showed performance values ranging from 20% to 85% higher than CPUs within its family and competitors.

<https://www.pugetsystems.com/labs/articles/amd-ryzen-threadripper-pro-7000-wx-series-content-creation-review/>

Phoronix Review:

In this review, the AMD CPU performance was tested and reported outstanding in all areas except for machine learning and artificial intelligence(top, page 10). Additionally,, the amount of watts used in the performance testing showed that despite the higher demand than most CPUs, the AMD CPU provided more per watt than other CPUs (bottom, page 10). In all other metrics, the CPU showed outstanding performance and energy use.

<https://www.phoronix.com/review/amd-linux-threadripper-pro-7995wx>

AnandTech review:

\*While this was a workstation review, there was a section specifically dedicated to the CPU, and the link leads to that portion of the benchmark test.

This organization tested the AMD CPU inside a specific workstation, the HP Z6 G5 A. The comparisons to similar CPUs show that the AMD Ryzen 7995 has better overall performance and results. However, the results suffer when comparing single-thread and multi-thread performance, as the CPU frequency is slower. Additionally, the CPU is not the best at encoding data, stating that the balance of Core, thread count, speed, and optimization influences the difference in the benchmark tests.

<https://www.anandtech.com/show/21143/hp-z6-g5-a-workstation-review-96-core-threadripper-pro-7995wx-impresses/5>

Overall:

While the CPU performance is lackluster with tasks requiring single threads or Artificial Intelligence/Machine Learning performance, functions that rely on CPU rendering and/or multi-threading show that the AMD Ryzen CPU has a gain of range from 20% to 85% increase in performance. Additionally, while the CPU is not the best at everything, in the benchmark tests where it was not the top performer, it was still within the top 4. It also bears mentioning that those categories are numbered between 1 and 3 within a category.

GPU REVIEW SYSTEM B (AMD)

AMD Radeon™ PRO W7900 Reviews

Puget Systems Review:

The GPU is a great workhorse, but it only suffers in the rendering tests. However, the programs used to test the GPU did not fully support it. The GPU has higher VRAM and better rasterization than its NVIDIA counterparts. In most tests, the GPU matches their NVIDIA counterparts. In most cases, some of the software does not yet have full compatibility with the GPU (card released April 2023, test performed June 2023).

<https://www.pugetsystems.com/labs/articles/amd-radeon-pro-7800-and-7900-content-creation-review/>

Develop3d review:

In this review, some of the tests demonstrated that some of the GPU capabilities exceeded their competition. In contrast, in other tests, they were only beaten by the highest-tier GPU of their competitor and suffered in ray-tracing 3d workflows. However, the testers noted that some of the software used had not yet been updated to support AMD at the time of the test, and since the test was performed, AMD has routinely provided updates and patches to improve performance. The deciding factor will be whether or not the client will be working with ray tracing.

<https://develop3d.com/workstations/review-amd-radeon-pro-w7900-and-pro-w7800/>

How-To-Geek AMD versus NVIDIA ray-tracing specific review.

This review compares the AMD RX 7600 to the NVIDIA RTX 4080(consumer-level cards). However, it demonstrates that AMD is comparable to NVIDIA in terms of non-raytracing performance and price, as the AMD is ~$330 and the NVIDIA is ~$1100.

<https://www.howtogeek.com/its-2024-can-amd-graphics-cards-handle-ray-tracing-yet/>

Hot Hardware Review

This review, conducted about a month after the previous one, demonstrates that the updates and patches have significantly improved ray tracing. However, it still lags behind the highest-tier NVIDIA cards. The only area where the competition outshines AMD is image decoding, with AMD being about 50% slower. However, the test shows that the AMD GPU can decode about 302-308 raw 4K quality frames per second and 76-79 raw 8K quality frames per second.

<https://hothardware.com/reviews/amd-radeon-pro-w7900-and-w7800-review-rdna3-pro-vis?page=2>

SYSTEM B GPU (AMD) compatibility with:

1. MAYA

Supported by Autodesk

<https://www.autodesk.com/support/system-requirements/certified-graphics-hardware/autocad>

2. 3D Studio Max

AMD supported

<https://damassets.autodesk.net/content/dam/autodesk/external-assets/support-articles/3ds-max-certified-hardware/6_3dsmax_2024_02_01_2024.pdf>

3. Blender

AMD supported by blender

<https://www.blender.org/download/requirements/>

SELECTION OF SDK

The company will focus on using the Xbox environment to develop games, based on the specifications below and the economy, such as Xbox Pass and backward compatibility.

1. CPU

Custom AMD Zen 2

8 Cores @ 3.8 GHz (3.66 GHz with SMT)

2. GPU

Custom RDNA 2

52 CUs @ 1.825 GHz 12 TFLOPS

3. Memory

16 GB GDDR6

10 GB with 320-bit bus (560 GB/s) and 6 GB with 192-bit bus (336 GB/s)

4. Support

Allows for support between Xbox Series X and S as well as Xbox One

5. Product (games) selection

424 games for the Xbox Series X with full compatibility of Xbox One games and several titles from Xbox 360 and Xbox

6. Exclusive Titles

Approximately 61

7. Multi-functionality( what else can you don on the system)

Xbox series X can also stream videos from apps like Netflix and Disney, live-action entertainment such as Twitch, ESPN, and UFC, and music apps.

The price of Software Development Kit for Xbox Series X is $99 for corporations ($19 for individuals)

If Xbox approves a game idea, the first 1-2 Game development kits will be loaned out at no charge for the duration of the game's development.

PERFORMANCE COMPARISON

We will be working with the following assumptions:

* The program has an instruction count of 100,000
* 50% of the program executes in the ALU, 20% in Load, 10% in Store, and 20% in Branch
* Knowing that the most significant improvement comes from making minor changes to a program's most extensive instruction set, we will assume that we discovered that we can improve the 4-cycle portion of the program and the 6-cycle program.

| Cycles Per Instruction for Intel System(A) | | | |
| --- | --- | --- | --- |
| Operation | Frequency | Cycles | CPI |
| ALU | 50% | 4 | 2 |
| Load | 20% | 4 | 0.8 |
| Store | 10% | 4 | 0.4 |
| Branch | 20% | 4 | 0.8 |
|  |  | TOTAL CPI | 4 |

| SYSTEM A(INTEL) | | |
| --- | --- | --- |
| CPI= Cycles/instructions = 3.2 billion/100,000 | | 32,000 |
| Seconds per Cycle(3.2 GHz)3.2 billion | | 0.3125 nanoseconds |
| Execution Time= | | 0.000140625 Seconds |
| Amdahl's Law, S = speed up , P =Portion improved(50% or 0.5), N= Number of cores (24)  Amdahl's Law, S = speed up , P =Portion improved(20% or 0.2), N= Number of cores (24) | | 92% improvement  24% improvement |
| PERFORMANCE IS | | 7,111.11 |

| Cycles per Instruction for AMD system | | | |
| --- | --- | --- | --- |
| Operation | Frequency | Cycles | CPI |
| ALU | 50% | 1 | 0.5 |
| Load | 20% | 1 | 0.2 |
| Store | 10% | 8 | 0.8 |
| Branch | 20% | 6 | 1.2 |
|  |  | TOTAL CPI | 2.7 |

| SYSTEM B(AMD) | | |
| --- | --- | --- |
| CPI= 2.5 billion/100,000 | | 25,000 |
| Seconds per Cycle (2.5 GHz)2.5 billion | | 0.4 nanoseconds |
| Execution Time= | | 0.00018 Seconds |
| Amdahl's Law, S = speed up , P =Portion improved(50% or 0.5), N= number of processors(96) | | 98% improvement  25% improvement |
| PERFORMANCE IS | | 5,555.55 |

Performance comparison:

From this we can see that System A has the better performance so we will focus on that system from here on out.

SOFTWARE

| Type of Software | Vendor | Price |
| --- | --- | --- |
| Operating System | Windows SDK | Free |
| Backup | Windows | Free |
| Antivirus | Windows Defender | Free |
| Communication/Collaboration | Discord | Free |
| Presentation | Google Slides | Free |
| Spreadsheet | Google Sheets | Free |
| Database | Azure(Microsoft) | $50 a month for 3 years for 730 Hours  Additional data and extra time |
| Photo Imaging/Editing | gimp.com | Free |
| 2D and 3D Graphics | Blender | Free |
| Animation | Blender | Free |
| Video and Audio Creation/Editing | Cyberlink  PowerDirector 365 | $74.99/year |
| Text editor | Vim | Free |

PROJECT COST AND BENEFITS

Direct Costs

| Hardware |  |
| --- | --- |
| Intel® Core™ i9 processor 14900k | $549.00 |
| ASUS ROG MAXIMUS Z790 FORMULA LGA 1700 | $767.94 |
| CORSAIR Vengeance RGB 64GB | $189.99 x 4 ~ $760 |
| NVIDIA Quadro P4000 | $420.00 |
| BarraCuda 3.5" Hard Drive 8TB | $134.99 |
| ASUS ROG Swift PG279QZ | $229.00 |
| Logitech Signature M650 | $39.99 |
| RGB Mechanical Gaming Keyboard AW410K | $71.22 |
| TOTAL | 2,972.14 Per Employee (3) = 8,916.42 |
| Software |  |
| Database(Azure) | $50 per month |
| Video and Audio Creation/Editing | $74.99 per year |
| All OTHER SOFTWARE | Free |
| TOTAL | $675 per year \* 10 years = $6,750 |
| People/Development/Installation | $743.03 per Employee \*3 = $2,229.09 |
| Training | $168.75 |
| TOTAL | $18,063.96 |

Indirect Costs over 10 years

| Support costs | $13,374.63 |
| --- | --- |
| Energy Cost | $19,344 |
| Overhead | $20,000 |
| Operational Cost | $8,916.42 |
| TOTAL | $61,635.05 |

Total cost of ownership: $79,699.31

Benefits

Tangible benefits:

A reduced development time of over 240% per month over the i7-6950X. The old development cost per month was $15K per month, and with these new systems, it will be $6250 per month with a savings of $8750 per month. Over 10 years, this will result in savings of $1,050,000.

Intangible benefits:

With the reduction in development costs, the company can hire more personnel or, at the very least, sub-contract out certain aspects with which we are not experts, which will deliver a better game and game experience.

Since these systems will also allow us to produce games quicker, we can devote more time and energy to marketing via social media platforms like Twitch. This can create interest in our game rather than just releasing and hoping for the best.

In addition to spending more time on marketing, we can also devote more time to training, which will lead to the company creating better games.

Return on Investment