

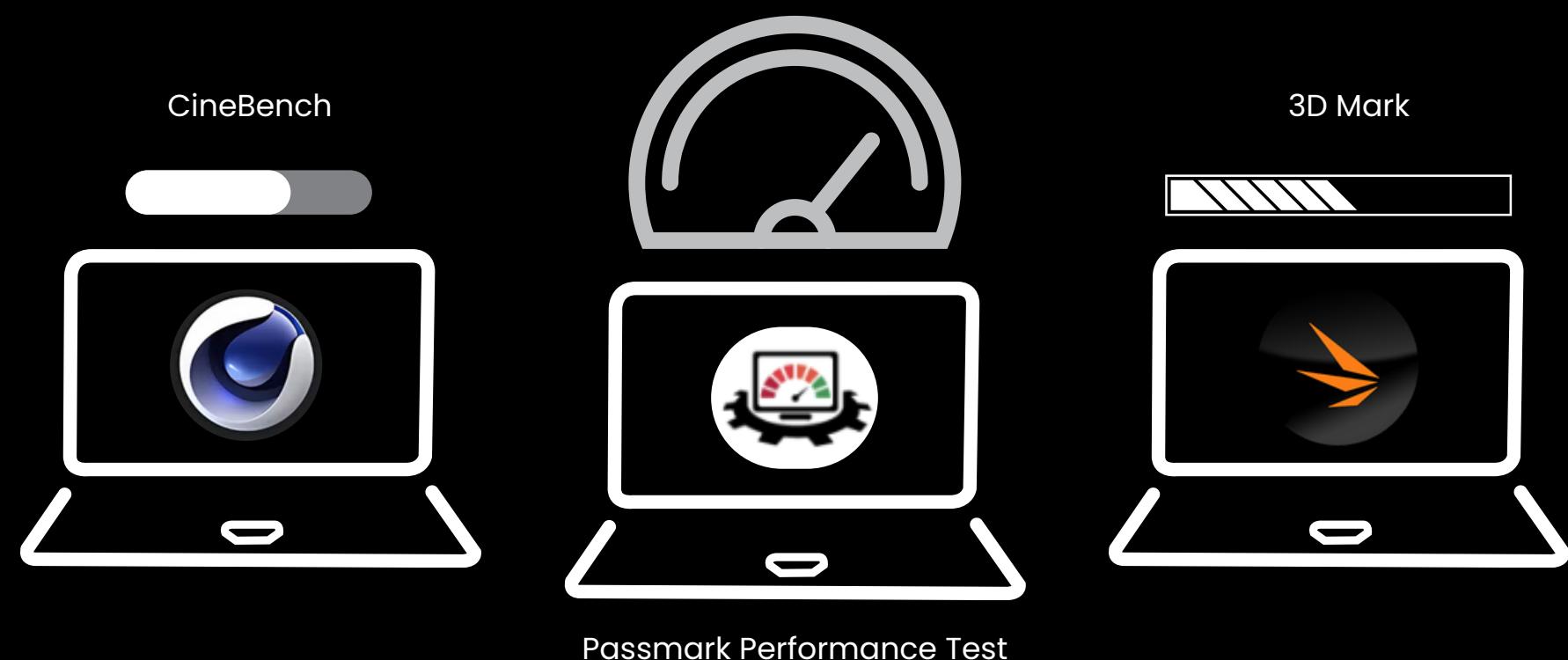
PERFORMANCE BENCHMARKING

HIGH-END / LOW-END LAPTOPS

INTRODUCTION

Benchmarking helps evaluate the performance of hardware objectively, so we can compare systems beyond just specifications

Our goal is to analyze and compare the performance of three laptops using three popular benchmarking tools and identify the best device in terms of performance and cost-effectiveness



DEVICE SELECTION



HP Notebook 15 da2014tx

ENTRY-LEVEL



Asus VivoBook X521EQ

MID-RANGE



Asus ROG Zephyrus G15 GA503QM

HIGH-PERFORMANCE

- Intel® Core™ i5-10210U (10th Gen, 4 cores, 8 threads, 1.6 GHz base, up to 4.2 GHz turbo)
- NVIDIA® GeForce® MX110 (2 GB GDDR5)
- 8 GB DDR4
- 512 GB NVMe SSD
- 15.6" FHD (1920×1080)
- 65W

- Intel® Core™ i7-1165G7 (11th Gen, 4 cores, 8 threads, 2.8 GHz base, up to 4.7 GHz turbo)
- NVIDIA® GeForce® MX350 (2 GB GDDR5)
- 8 GB DDR4
- 512 GB NVMe SSD
- 15.6" FHD (1920×1080)
- 65W

- AMD Ryzen™ 9 5900HS (8 cores, 16 threads, 3.3 GHz base, up to 4.6 GHz boost)
- NVIDIA® GeForce® RTX 3060 Laptop GPU (6 GB GDDR6) + Radeon™ Integrated GPU
- 16 GB DDR4
- 1TB+512GB NVMe SSD
- 15.6" QHD (2560×1440, 165 Hz)
- 200W

BENCHMARKING TOOLS



3DMark
GPU and gaming
performance (Graphics
score & FPS)

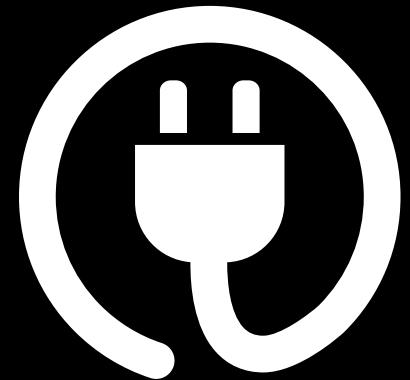


PassMark Performance Test
Overall system performance
(CPU, memory, disk, 2D/3D
GPU)



CINEBENCH
CPU rendering performance
Multi-core / Single-core score

EXPERIMENT SETUP



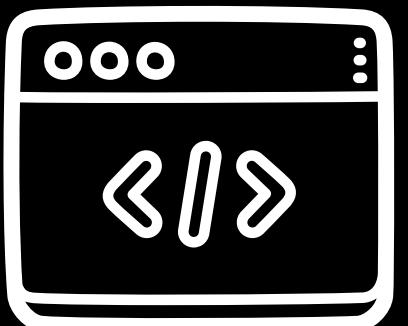
All tests run
on AC power



Background
apps disabled



Each benchmark
executed 3 times and
avg recorded

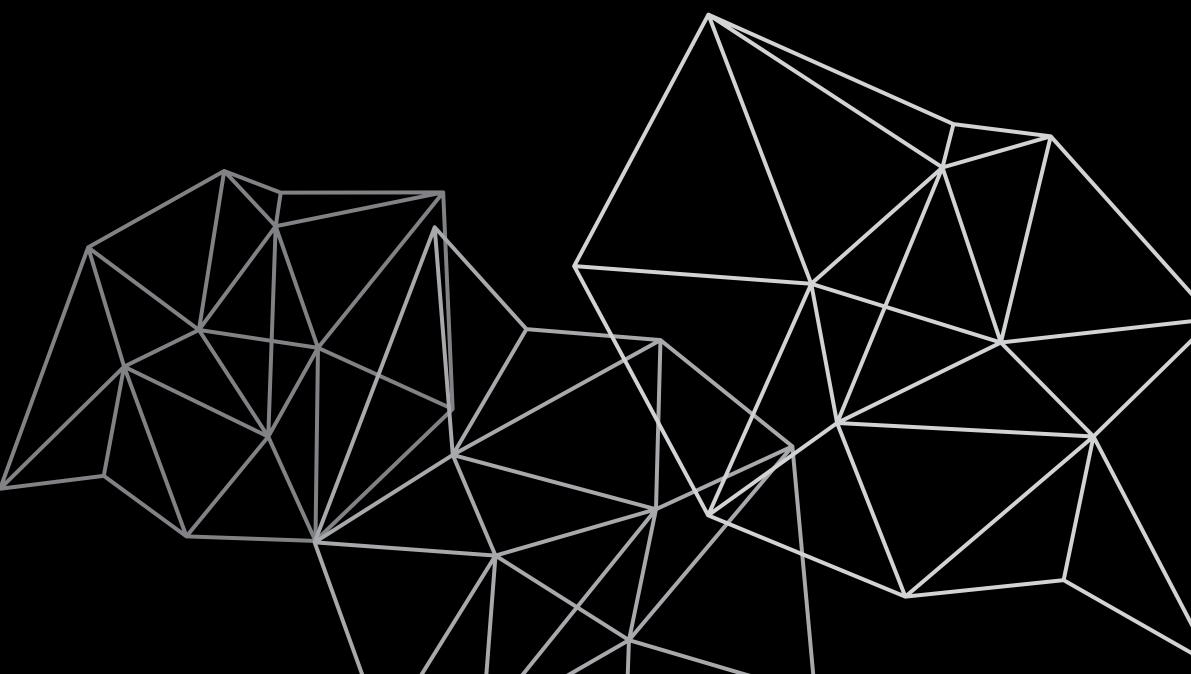
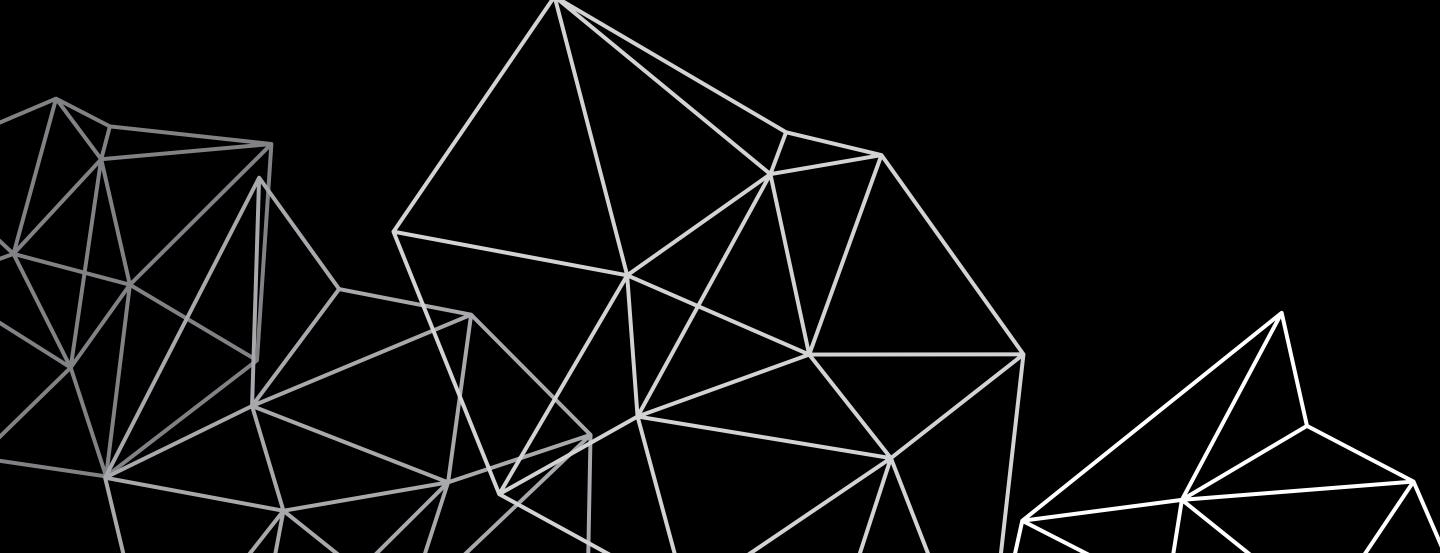


Same version of
benchmarking
software used

RESULTS PRESENTATION

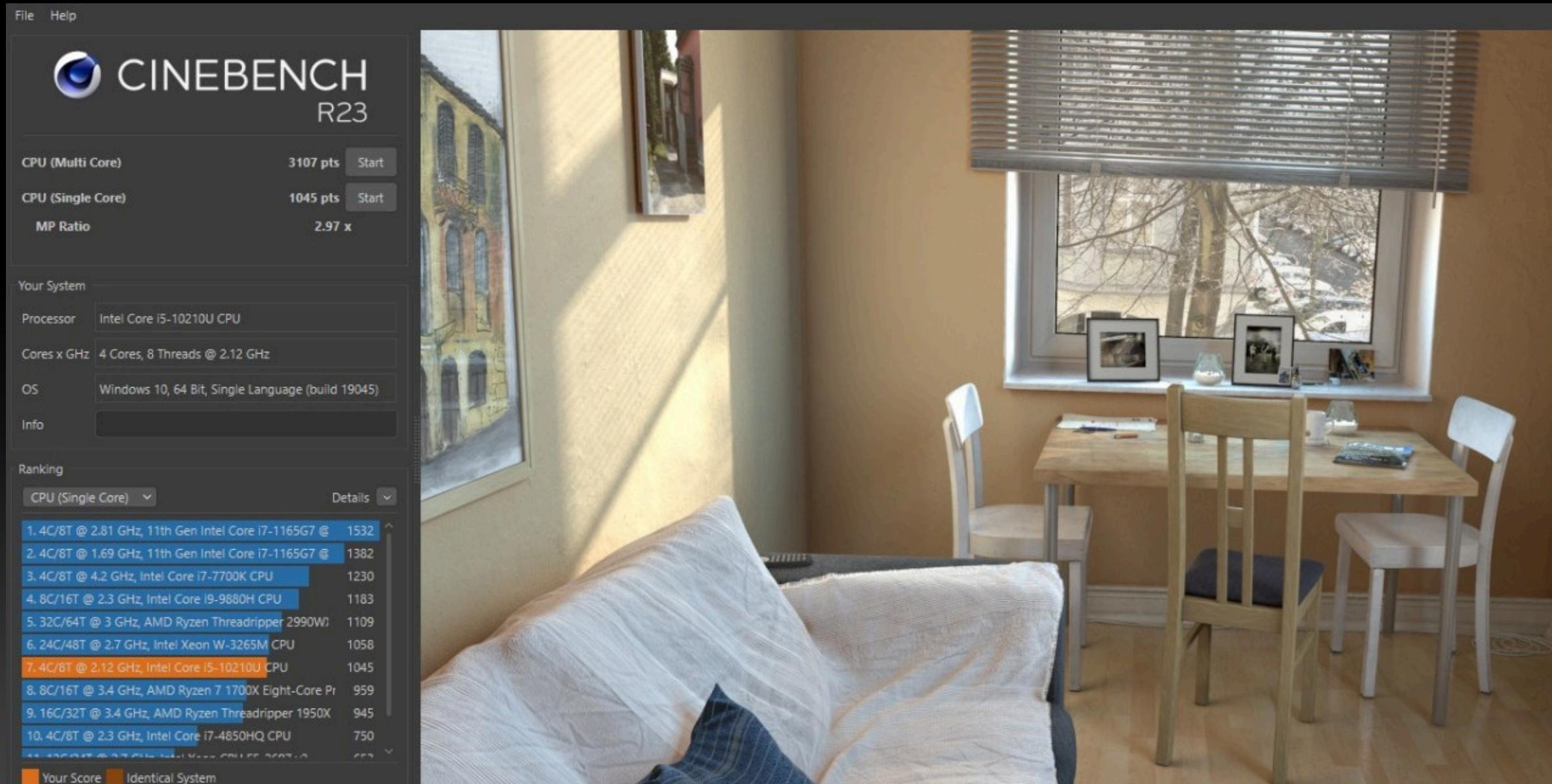


CINEBENCH R23

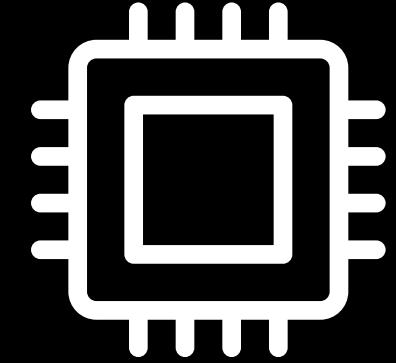




HP NOTEBOOK 15 DA2014TX



CINEBENCH

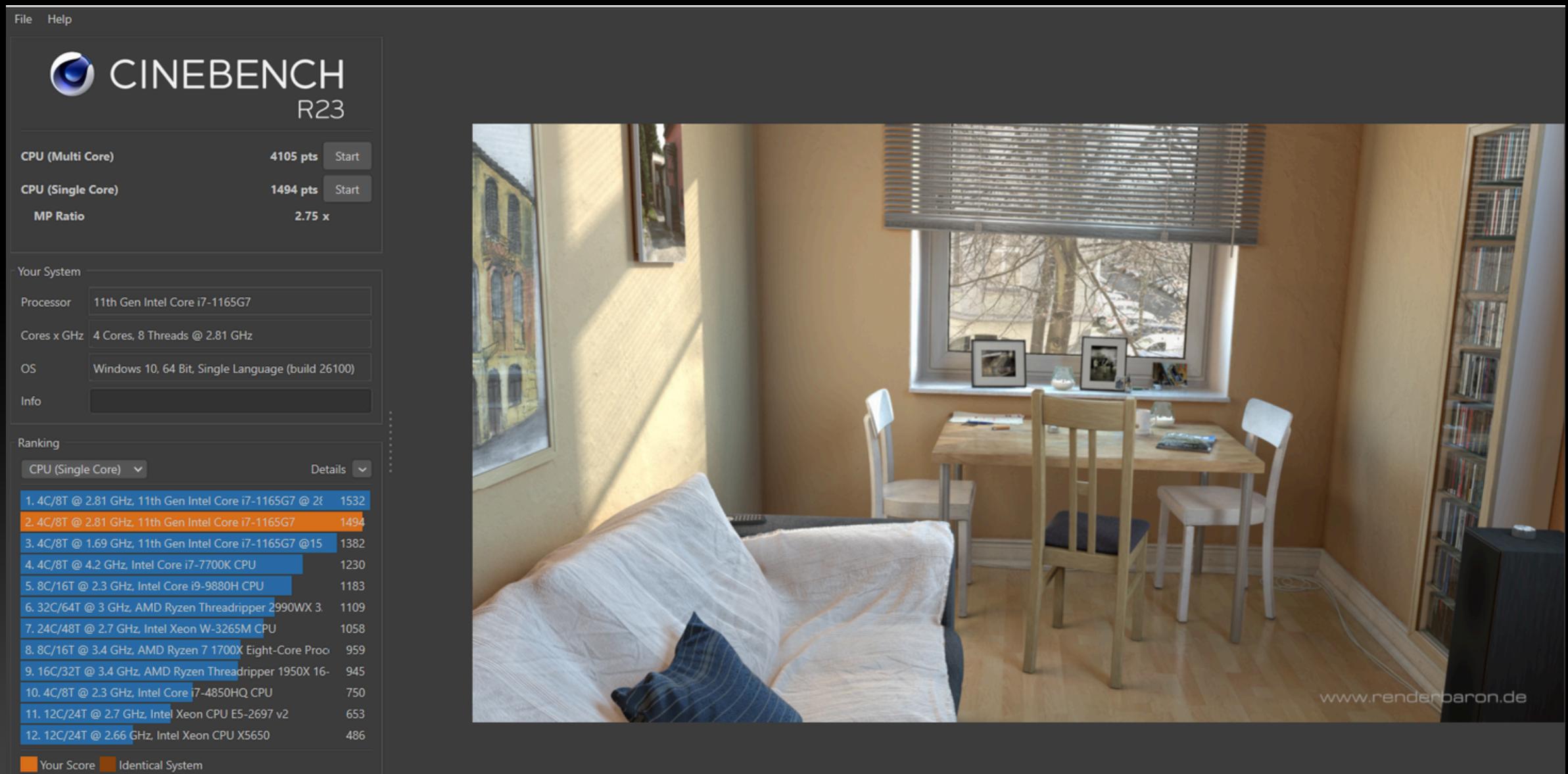


Intel Core i5 - 10210U
4 Cores, 8 Threads @ 2.12 GHZ
Windows 10, 64 Bit Single Language (Build 19045)

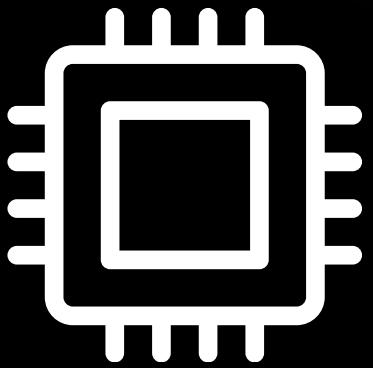
CPU (MULTI CORE) = 3107 pts
CPU (SINGLE CORE) = 1045 pts
MP RATIO = 2.97 X



ASUS VIVOBOOK X521EQ



CINEBENCH

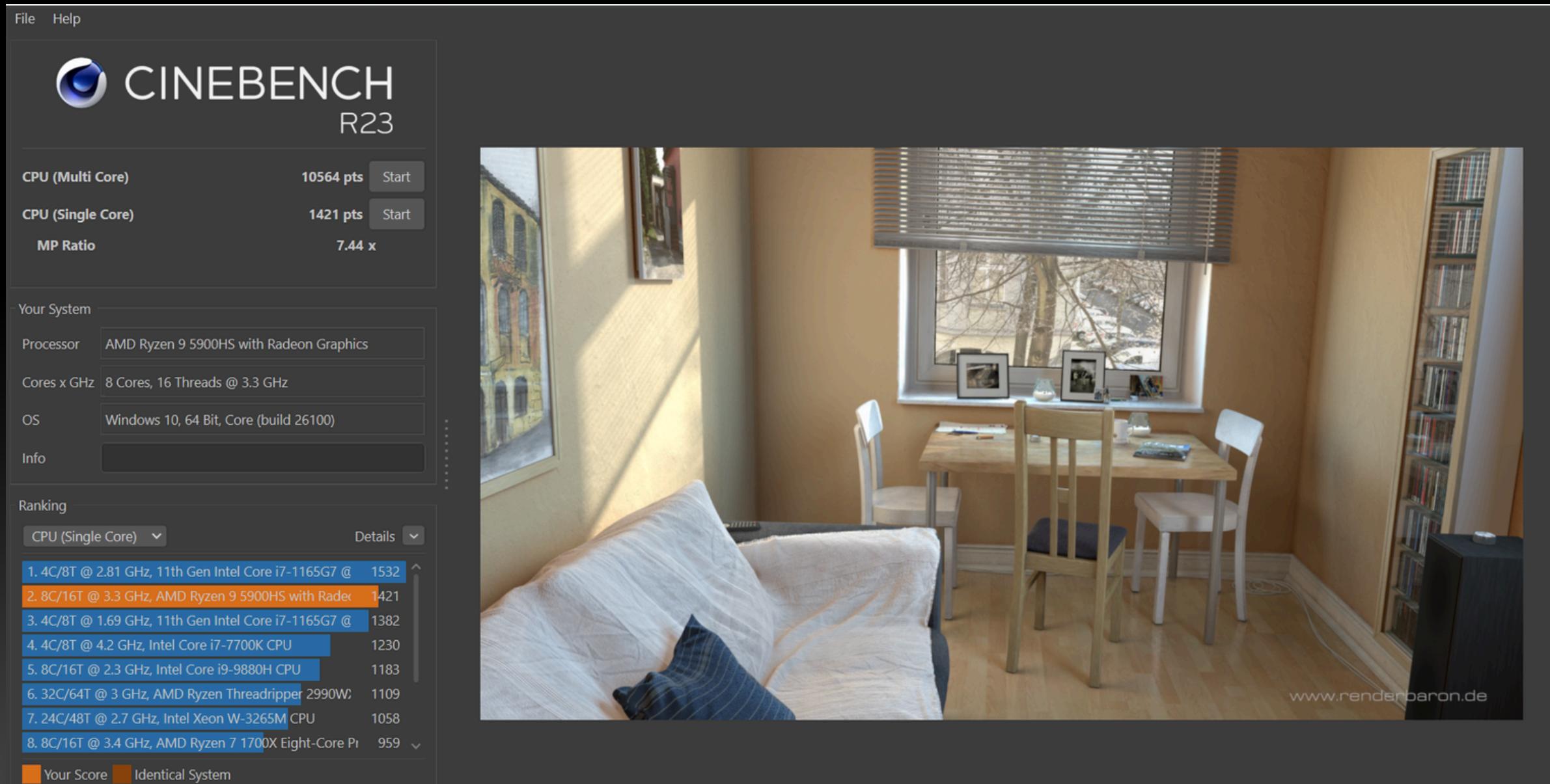


Intel Core i7 - 1165G7
4 Cores, 8 Threads @ 2.80 GHz
Windows 10, 64 Bit Single Language (Build 19045)

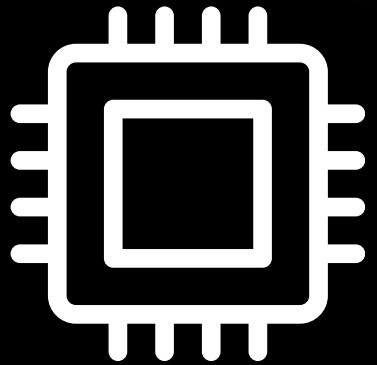
CPU (MULTI CORE) = 4105pts
CPU (SINGLE CORE) = 1494 pts
MP RATIO = 2.75 X



ASUS ROG ZEPHYRUS G15 GA503QM



CINEBENCH

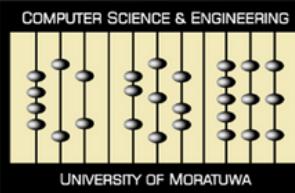


AMD Ryzen™ 9 5900HS
 (8 cores, 16 threads, 3.3 GHz base, up to 4.6 GHz boost)
 Windows 10, 64 Bit Single Language (Build 19045)

CPU (MULTI CORE) = 10564 pts
 CPU (SINGLE CORE) = 1421 pts
 MP RATIO = 7.74 X

RESULT SUMMARY

Laptop	Multi-core	Single-core	MP Ratio
HP 15 (i5 - 10210U)	3107	1045	2.97 x
ASUS Vivobook (i7 - 1165G7)	4105	1494	2.75 x
ASUS ROG G15 (Ryzen 9 5900HS)	10564	1421	7.74 x



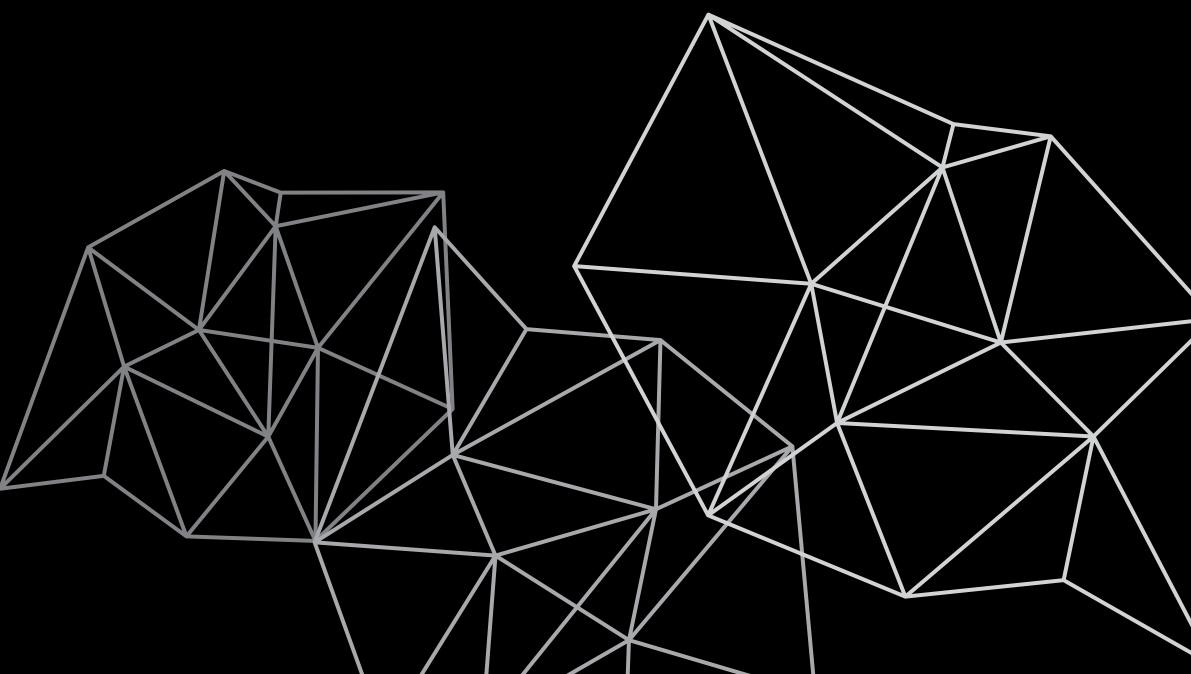
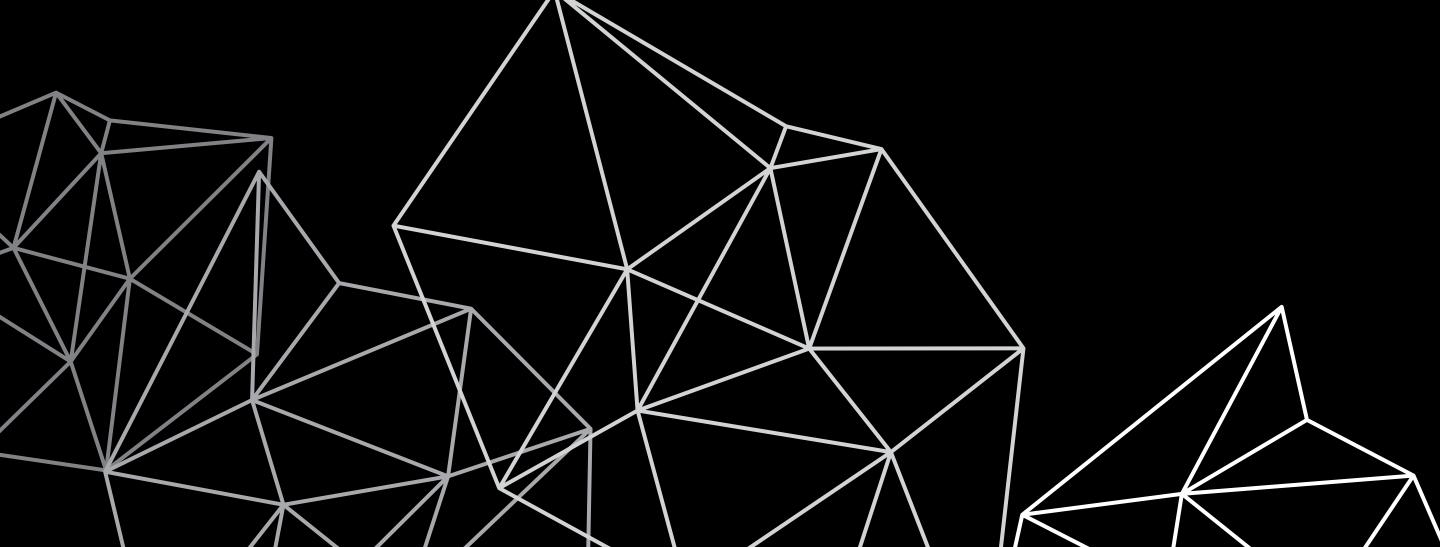
CS2053
Computer Architecture
Semester 03

GROUP
14

RESULTS PRESENTATION



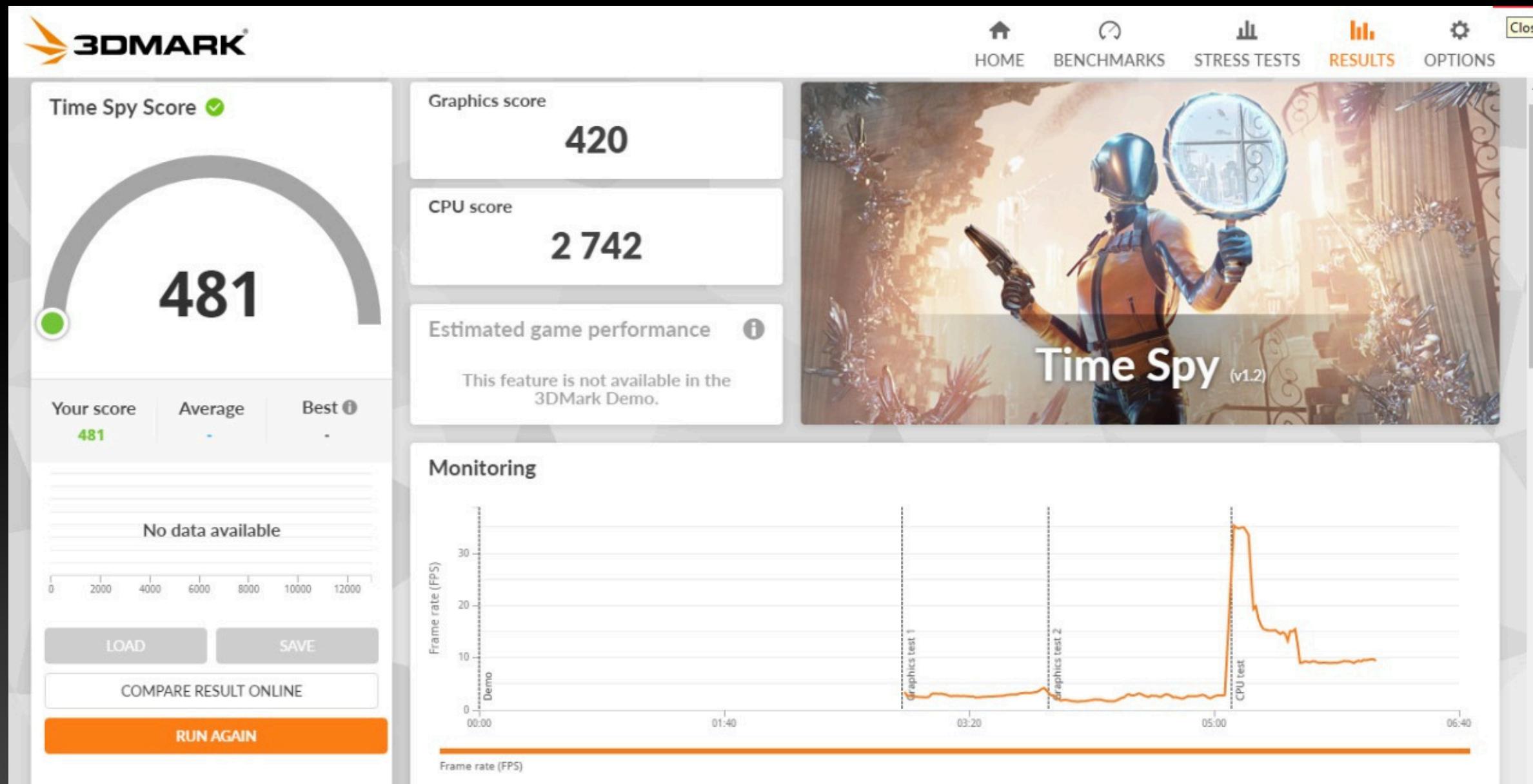
3D MARK



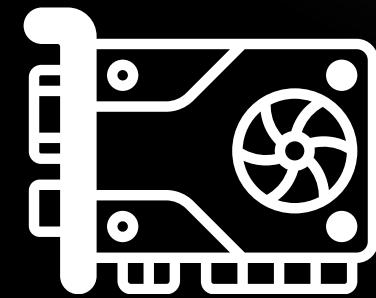


HP NOTEBOOK 15 DA2014TX

GROUP
14



3D MARK

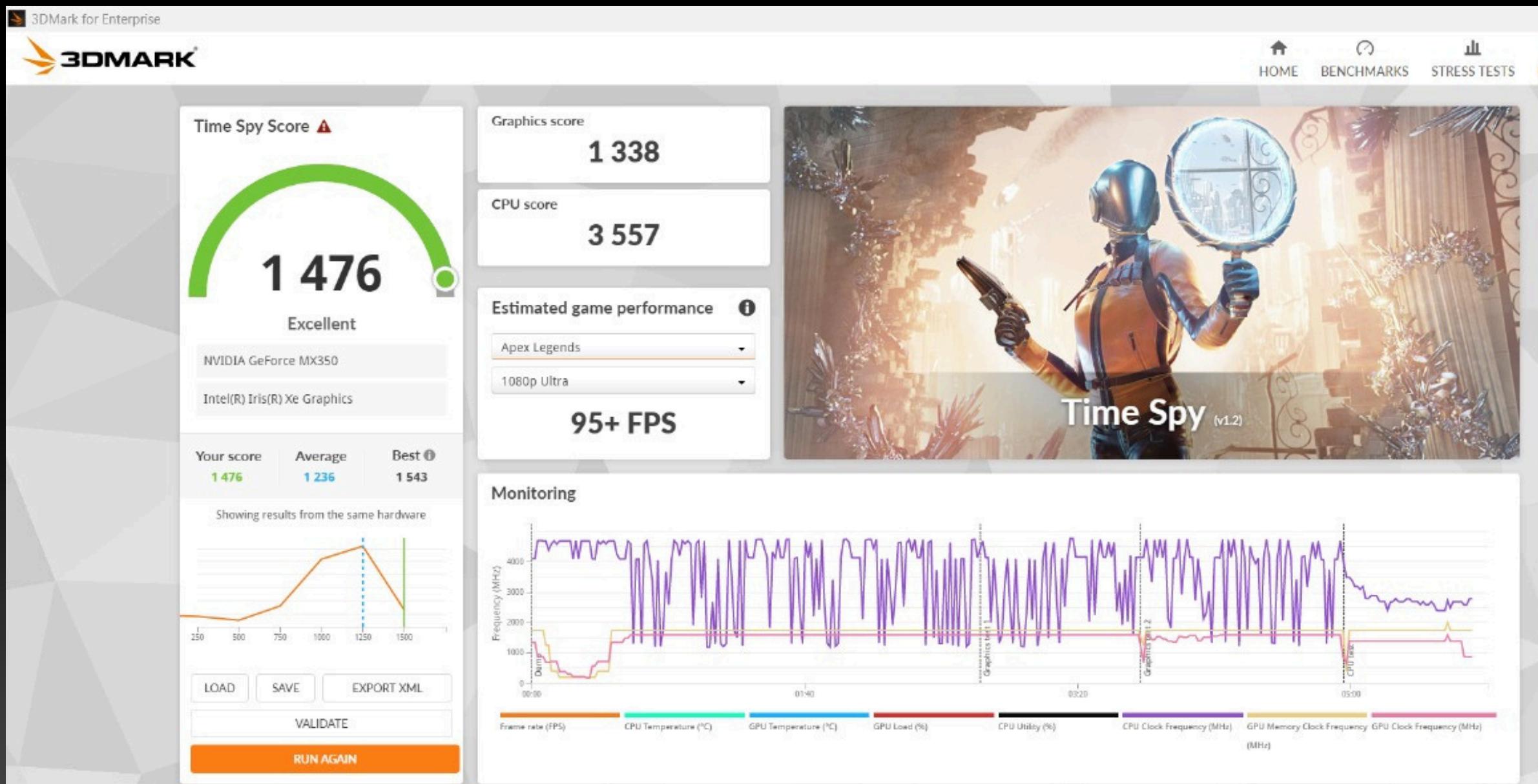


Intel Core i5 - 10210U
4 Cores, 8 Threads @ 2.12 GHZ
Windows 10, 64 Bit Single Language (Build 19045)
NVIDIA® GeForce® MX110 (2 GB GDDR5)

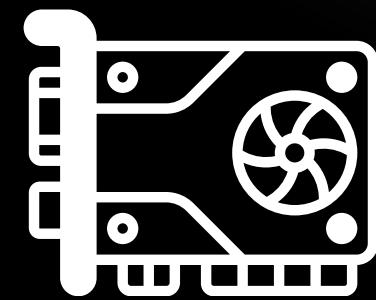
TIME SPY CORE	= 481 pts
CPU SCORE	= 2742 pts
GPU SCORE	= 420 pts



ASUS VIVOBOOK X521EQ



3D MARK

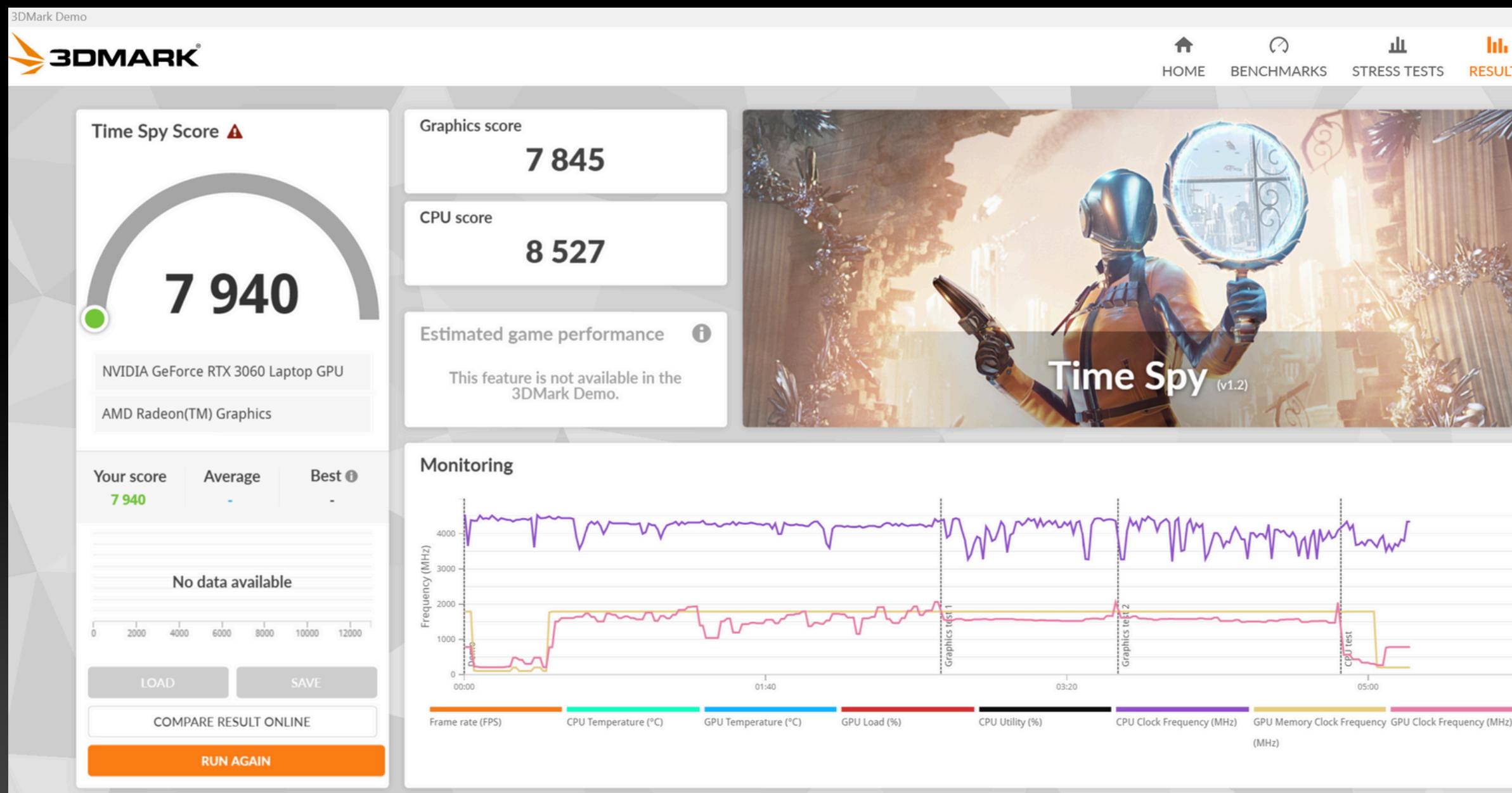


Intel Core i7 - 1165G7
4 Cores, 8 Threads @ 2.80 GHZ
Windows 10, 64 Bit Single Language (Build 19045)
NVIDIA® GeForce® MX350 (2 GB GDDR5)

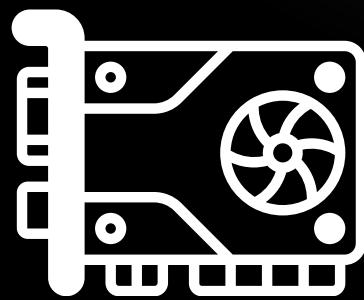
TIME SPY CORE = 1476 pts
CPU SCORE = 3557 pts
GPU SCORE = 1338 pts



ASUS ROG ZEPHYRUS G15 GA503QM



3D MARK



AMD Ryzen™ 9 5900HS
(8 cores, 16 threads, 3.3 GHz base, up to 4.6 GHz boost)
Windows 10, 64 Bit Single Language (Build 19045)
NVIDIA® GeForce® RTX 3060 Laptop GPU (6 GB GDDR6) +
Radeon™ Integrated GPU

TIME SPY CORE = 7940 pts
CPU SCORE = 7845 pts
GPU SCORE = 8527 pts

RESULTS PRESENTATION

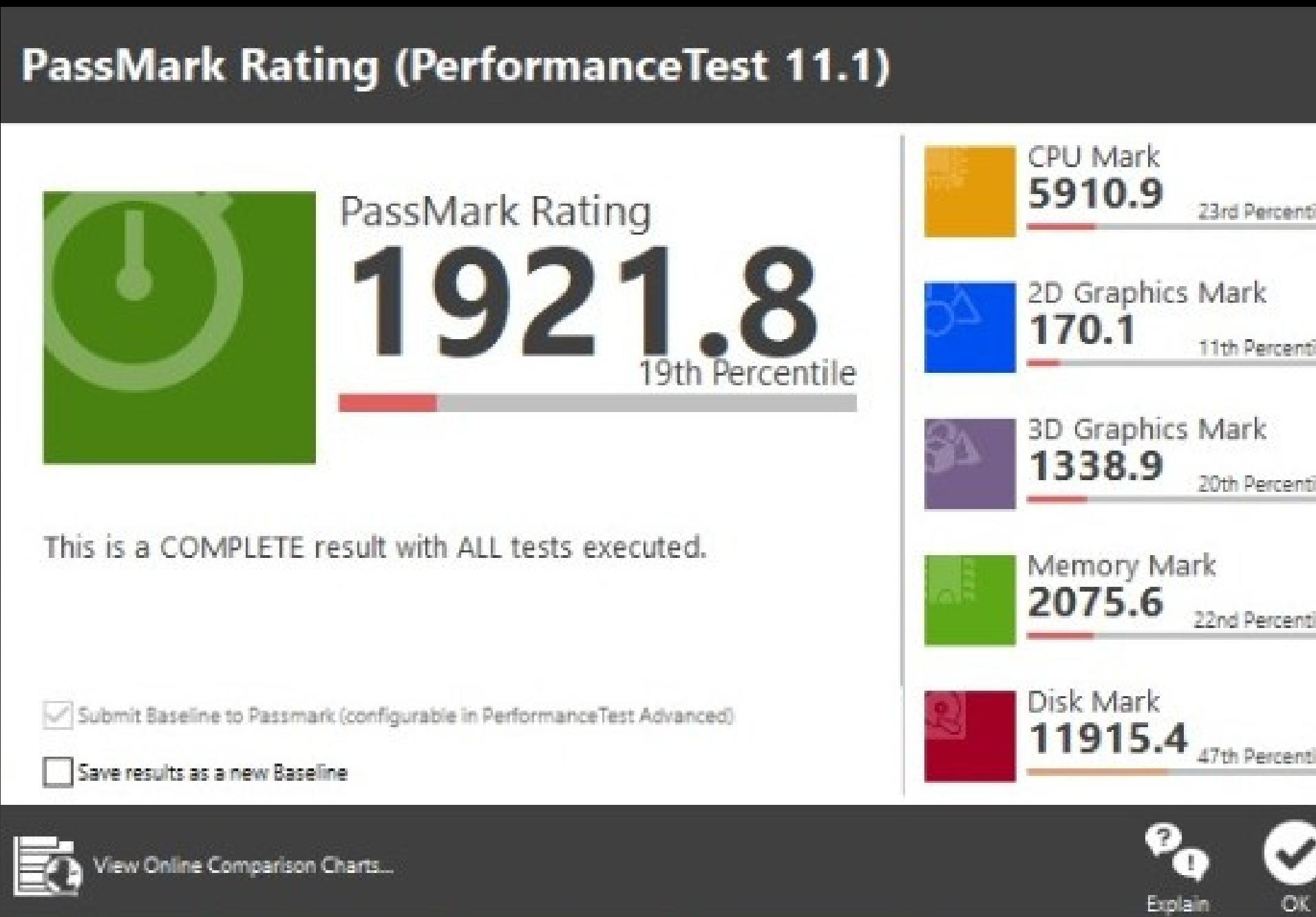


Passmark Performance Test

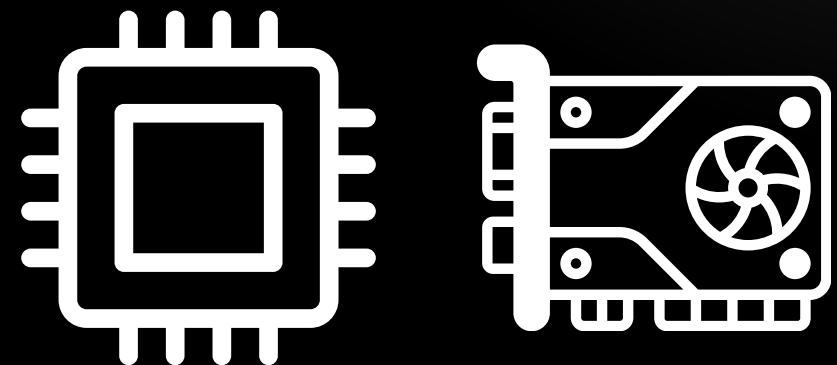


HP NOTEBOOK 15 DA2014TX

GROUP
14



PASSMARK



Intel Core i5 - 10210U
4 Cores, 8 Threads @ 2.12 GHZ
Windows 10, 64 Bit Single Language (Build 19045)
NVIDIA® GeForce® MX110 (2 GB GDDR5)

PASSMARK RATING = 1921.8

CPU MARK = 5910.9

2D GRAPHIC MARK = 170.1

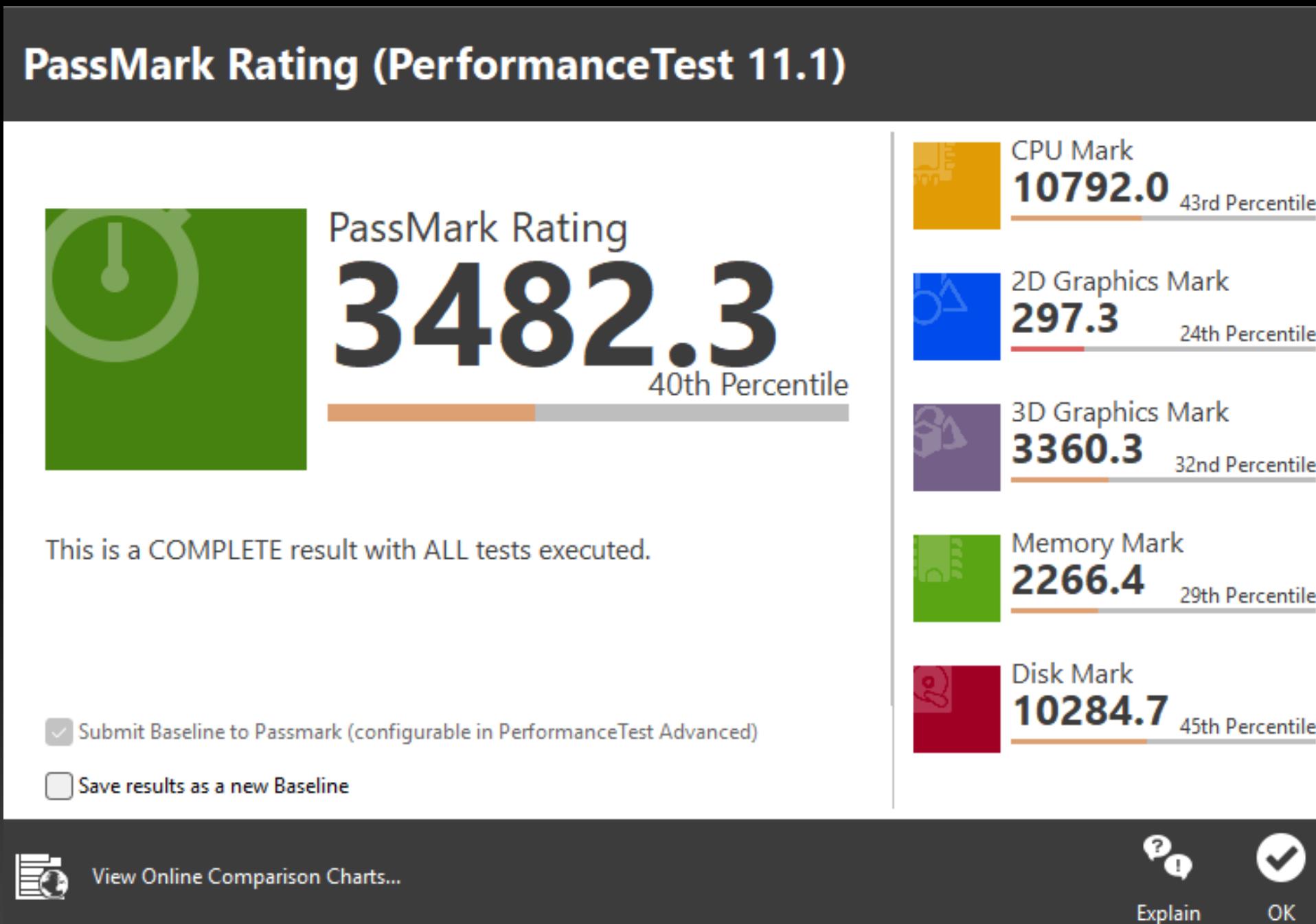
3D GRAPHIC MARK = 1338.9

MEMORY MARK = 2075.6

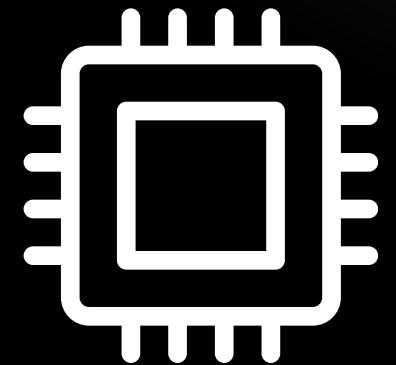
DISK MARK = 11915.4



ASUS VIVOBOOK X521EQ



PASSMARK



Intel Core i7 - 1165G7

4 Cores, 8 Threads @ 2.80 GHZ

Windows 10, 64 Bit Single Language (Build 19045)

NVIDIA® GeForce® MX350 (2 GB GDDR5)

PASSMARK RATING = 3482.3

CPU MARK = 10792.0

2D GRAPHIC MARK = 297.3

3D GRAPHIC MARK = 3360.3

MEMORY MARK = 2266.4

DISK MARK = 10284.7

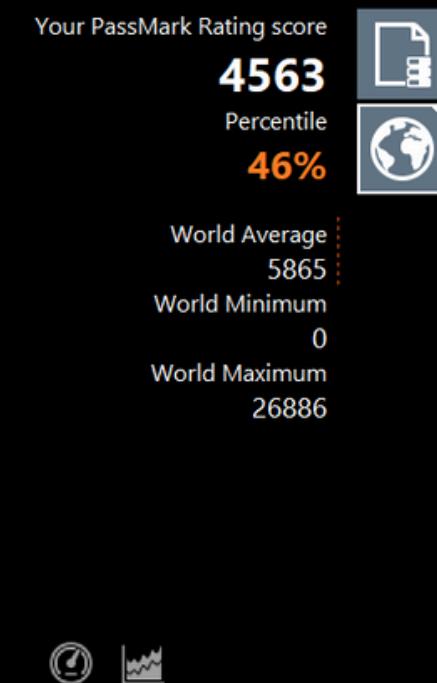
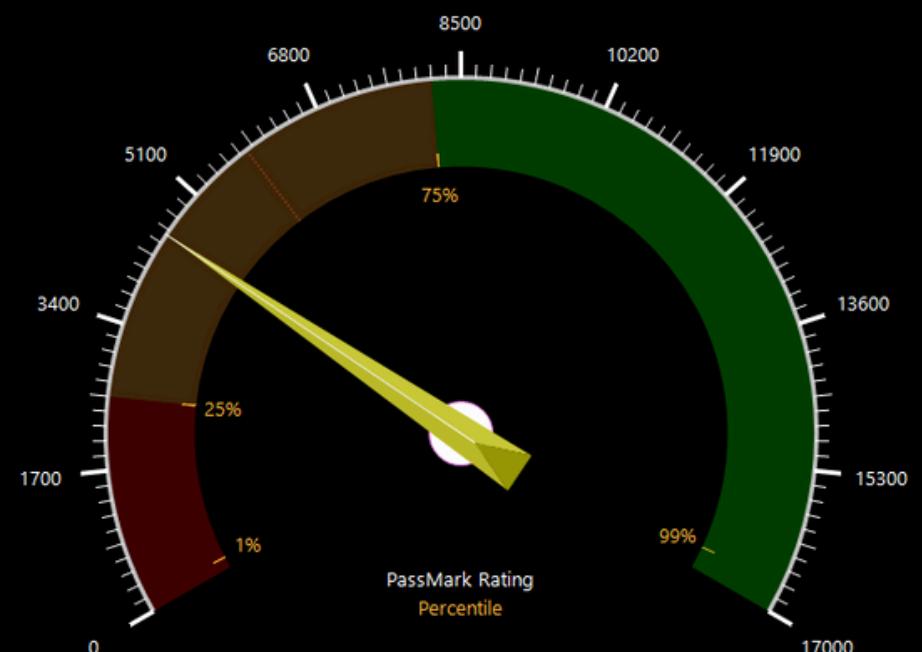


ASUS ROG ZEPHYRUS G15 GA503QM

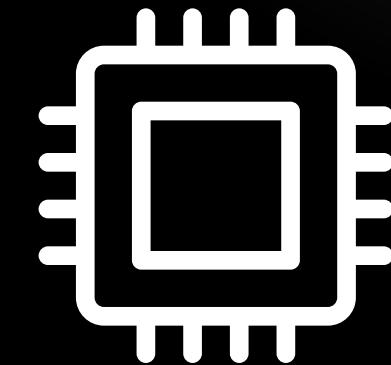


PASSMARK RATING

Your System vs the world



PASSMARK



AMD Ryzen™ 9 5900HS
(8 cores, 16 threads, 3.3 GHz base, up to 4.6 GHz boost)
Windows 10, 64 Bit Single Language (Build 19045)
NVIDIA® GeForce® RTX 3060 Laptop GPU (6 GB GDDR6) +
Radeon™ Integrated GPU

PASSMARK RATING = 4563

CPU MARK = 20498.0

2D GRAPHIC MARK = 93

3D GRAPHIC MARK = 4925

MEMORY MARK = 2742

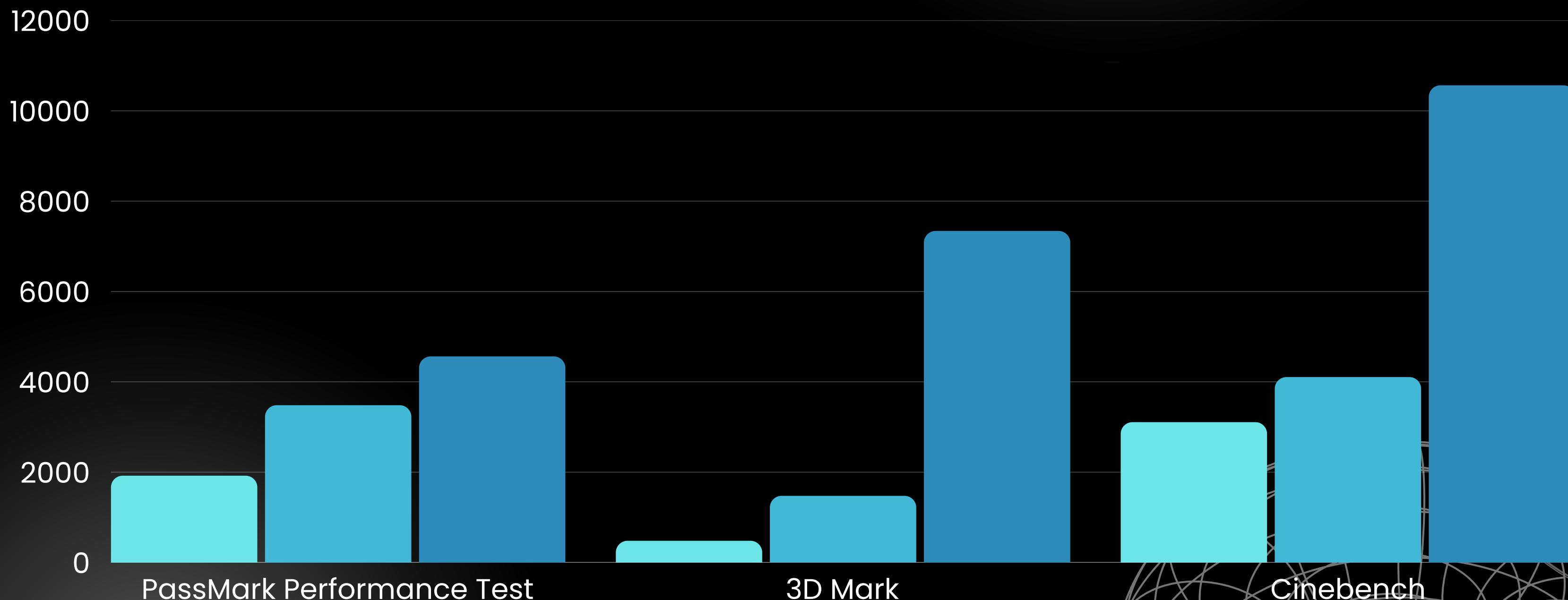
DISK MARK = 19548

BENCHMARK COMPARISON

● HP Notebook 15 da2014tx

● Asus Vivobook X521EQ

● Asus ROG Zephyrus G15 GA503QM



PUBLIC BENCHMARK COMPARISON

HP NOTE
BOOK 15

ASUS
VIVO
BOOK

ASUS
ZEPHYRUS
G15

HP NOTE
BOOK 15

ASUS
VIVO
BOOK

ASUS
ZEPHYRUS
G15

HP NOTE
BOOK 15

ASUS
VIVO
BOOK

ASUS
ZEPHYRUS
G15

TESTED
VALUE

3107

4105

10564

TESTED
VALUE

481

1476

7940

TESTED
VALUE

5910.7

10792

20498

PUBLIC
AVAILABLE
VALUE

3392

6716

12622

PUBLIC
AVAILABLE
VALUE

1020

2470

8475

PUBLIC
AVAILABLE
VALUE

6087

9894

21225

CPU Marks
CINEBENCH

TIMESPY OVERALL Marks
3D MARK

CPU Marks
PERFORMANCE TEST

PRICE VS PERFORMANCE ANALYSIS



HP Notebook 15 da2014tx

Intel® Core™ i5-10210U

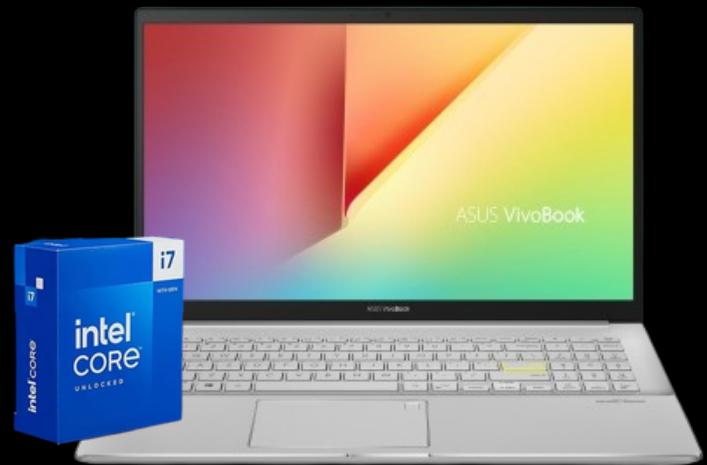
NVIDIA® GeForce® MX110
(2 GB GDDR5)

8 GB DDR4

512 GB NVMe SSD

15.6" FHD (1920×1080)

Rs. 125,000 (2020)



Asus VivoBook X521EQ

Intel® Core™ i7-1165G7

NVIDIA® GeForce® MX350 (2
GB GDDR5)

8 GB DDR4

512 GB NVMe SSD

15.6" FHD (1920×1080)

Rs. 200,000 (2020)



Asus ROG Zephyrus G15 GA503QM

AMD Ryzen™ 9 5900HS

NVIDIA® GeForce® RTX 3060 Laptop
GPU (6 GB GDDR6) + Radeon™

16 GB DDR4

1TB+512GB NVMe SSD

15.6" QHD (2560×1440, 165 Hz)

Rs. 448,000 (2023)

ANALYSIS & INTERPRETATION

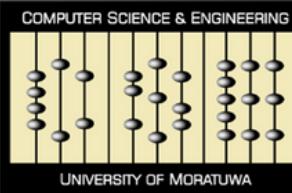
Laptop	Price (LKR)	PassMark	3DMark	Cinebench	PassMark /1000LKR	3DMark /1000LKR	Cinebench /1000LKR	Composite (0-1)	LKR per composite unit
HP Notebook 15 da2014tx	125000	1921.8	481	3107	15.37	3.85	24.86	0.2603	480268
Asus VivoBook X521EQ	200000	3482	1476	4105	17.41	7.38	20.53	0.4509	443535
Asus ROG Zephyrus G15 GA503QM	448000	4563	7340	10564	10.19	16.38	23.58	1	448000

ANALYSIS & INTERPRETATION

- **Asus VivoBook X521EQ:** Best overall balance of price and performance for student, office, and light multimedia use.
- **Asus ROG Zephyrus G15:** Ideal for serious gaming and GPU-intensive tasks; delivers top CPU and GPU performance but at a higher cost.
- **HP Notebook 15:** Cheapest option for basic CPU tasks; best Cinebench value per rupee but limited overall performance.

NOTES AND ASSUMPTIONS

- Equal weighting applied to PassMark, 3DMark, and Cinebench in composite score.
- CPU-heavy workloads favor higher Cinebench weighting (benefits HP).
- GPU-heavy workloads favor higher 3DMark weighting (benefits ROG G15).
- Prices correspond to 2020 and 2023; actual market prices may vary.



TEAM CONTRIBUTION

L.H.M.M.D.BANDARA | 230078B

Responsible for data collection, graph plotting, and delivering the presentation.

K.G.D.S.RANASINGHE | 230522H

Conducted benchmarking for the high end laptop, designed the presentation, and supported data collection.

H.M.M.M. HERATH | 230242A

Conducted benchmarking for the mid range laptop, prepared the report, and supported data collection

H.M.S.B.B.HEARTH | 230244G

Conducted benchmarking for the low end laptop and contributed to report styling.

B. K. P. DE SILVA | 230123K

Contributed to report preparation and managed the report layout and overlay.

Q&A



THANK YOU

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H.M.M.M. HERATH | 230242A
H.M.S.B.B.HEARTH | 230244G
B. K. P. DE SILVA | 230123K