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学号：20281158

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- 测试结果
- 实验分析

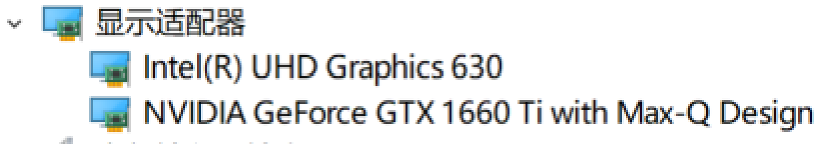
测试设备

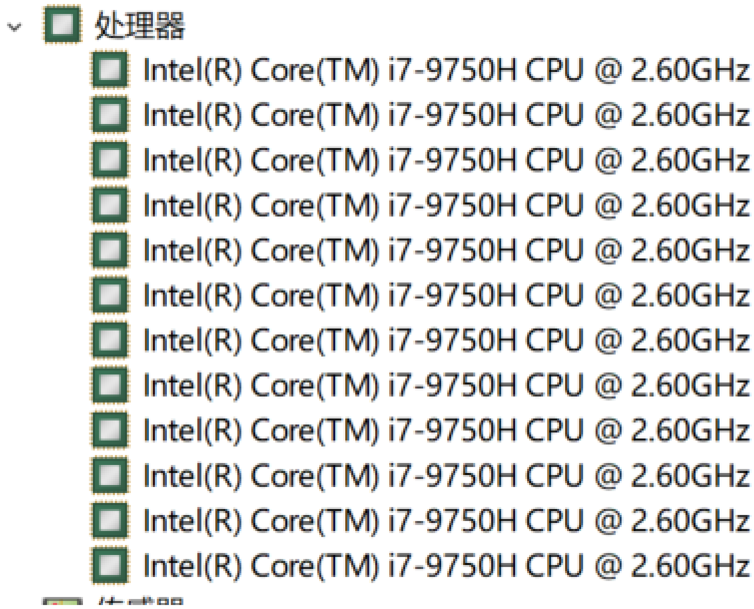
测试软件：AIDA64 Extreme
测试设备：

1. 测试设备一：G3 3590

G3 3590

设备名称	DESKTOP-MC6QJDK
处理器	Intel(R) Core(TM) i7-9750H CPU @ 2.60GHz 2.59 GHz
机带 RAM	20.0 GB (19.8 GB 可用)
设备 ID	0496BBDF-000C-441B-BB7C-8703B8023717
产品 ID	00342-35534-53352-AAOEM
系统类型	64 位操作系统, 基于 x64 的处理器
笔和触控	没有可用于此显示器的笔或触控输入

> 测试设备一
>
> 
>
> 显示适配器
> Intel(R) UHD Graphics 630
> NVIDIA GeForce GTX 1660 Ti with Max-Q Design
>
> 显卡设置：GTX 1660 Ti



处理器
Intel(R) Core(TM) i7-9750H CPU @ 2.60GHz
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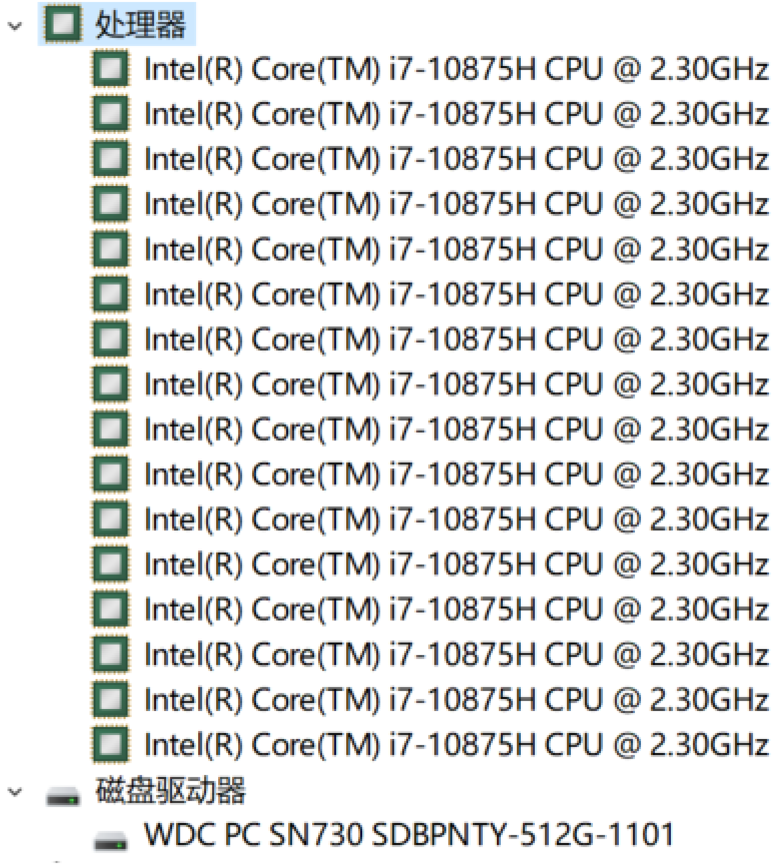
> cpu设置：12核cpu i7-9750H(2.60GHZ)

2. 测试设备二：Legion Y7000P2020H

Legion Y7000P2020H

设备名称	cxc-y7000p
处理器	Intel(R) Core(TM) i7-10875H CPU @ 2.30GHz 2.30 GHz
机带 RAM	16.0 GB (15.9 GB 可用)
设备 ID	99547AF5-A168-43B4-82E7-EB31C9DD790B
产品 ID	00342-36126-52150-AAOEM
系统类型	64 位操作系统, 基于 x64 的处理器
笔和触控	没有可用于此显示器的笔或触控输入



- 处理器
  - Intel(R) Core(TM) i7-10875H CPU @ 2.30GHz
  - Intel(R) Core(TM) i7-10875H CPU @ 2.30GHz
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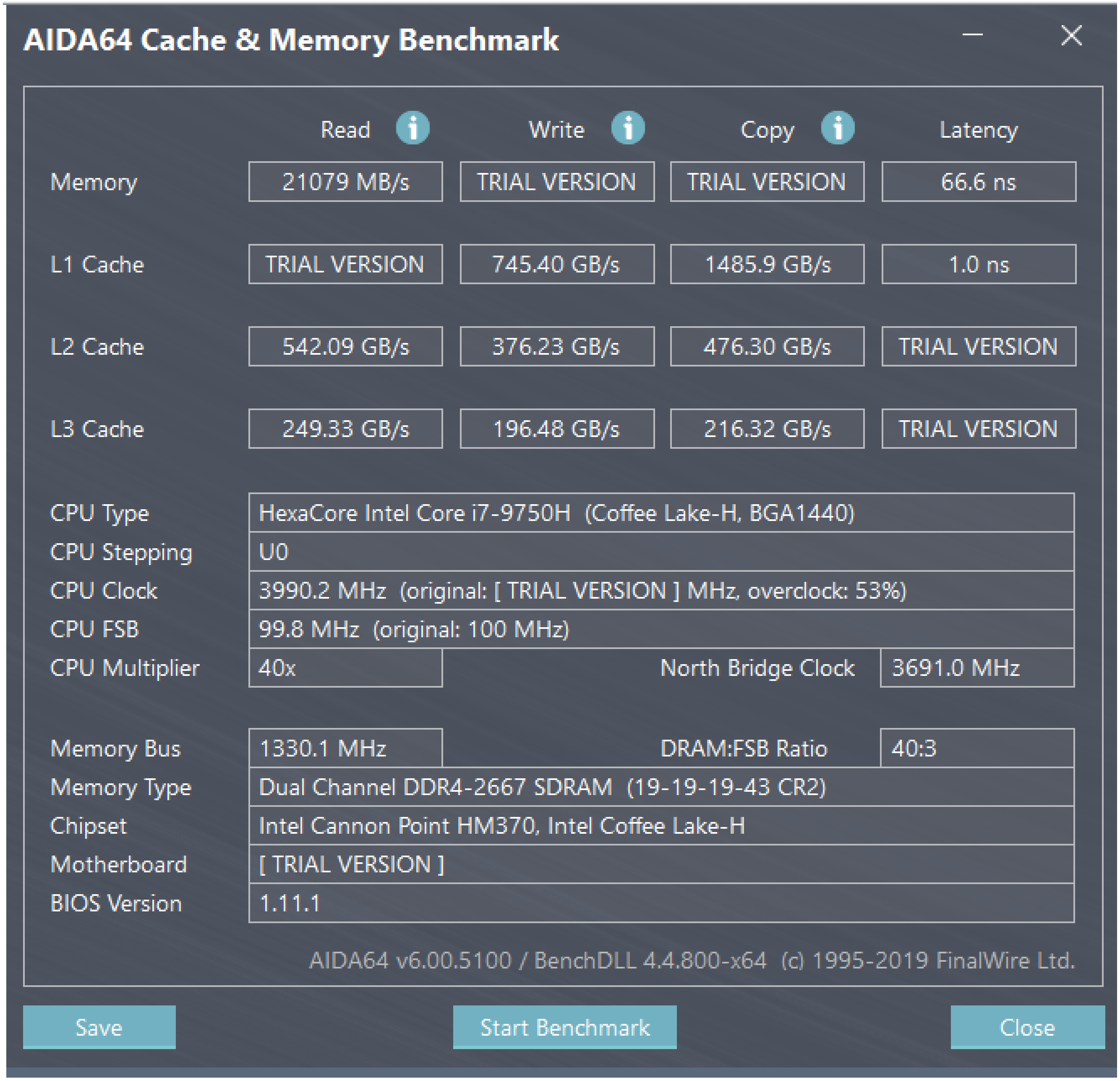
  - Intel(R) Core(TM) i7-10875H CPU @ 2.30GHz
  - Intel(R) Core(TM) i7-10875H CPU @ 2.30GHz
- 磁盘驱动器
  - WDC PC SN730 SDBPNTY-512G-1101

> CPU设备：16核i7-10875H(2.30GHZ)

测试结果

在G3 3590(DESKTOP-MC6QJDK)上的测试结果
内存读取测试



AIDA64 Cache & Memory Benchmark

	Read	Write	Copy	Latency
Memory	21079 MB/s	TRIAL VERSION	TRIAL VERSION	66.6 ns
L1 Cache	TRIAL VERSION	745.40 GB/s	1485.9 GB/s	1.0 ns
L2 Cache	542.09 GB/s	376.23 GB/s	476.30 GB/s	TRIAL VERSION
L3 Cache	249.33 GB/s	196.48 GB/s	216.32 GB/s	TRIAL VERSION

CPU Type	HexaCore Intel Core i7-9750H (Coffee Lake-H, BGA1440)		
CPU Stepping	U0		
CPU Clock	3990.2 MHz (original: [TRIAL VERSION] MHz, overclock: 53%)		
CPU FSB	99.8 MHz (original: 100 MHz)		
CPU Multiplier	40x	North Bridge Clock	3691.0 MHz
Memory Bus	1330.1 MHz	DRAM:FSB Ratio	40:3
Memory Type	Dual Channel DDR4-2667 SDRAM (19-19-19-43 CR2)		
Chipset	Intel Cannon Point HM370, Intel Coffee Lake-H		
Motherboard	[TRIAL VERSION]		
BIOS Version	1.11.1		

AIDA64 v6.00.5100 / BenchDLL 4.4.800-x64 (c) 1995-2019 FinalWire Ltd.

CPU测试

AIDA64 GPGPU Benchmark

☑ GPU1: NVIDIA GeForce GTX 1660 Ti with Max-Q Design (TU116)
1335 MHz, 1536 cores, 24 CUs, Driver 512.72

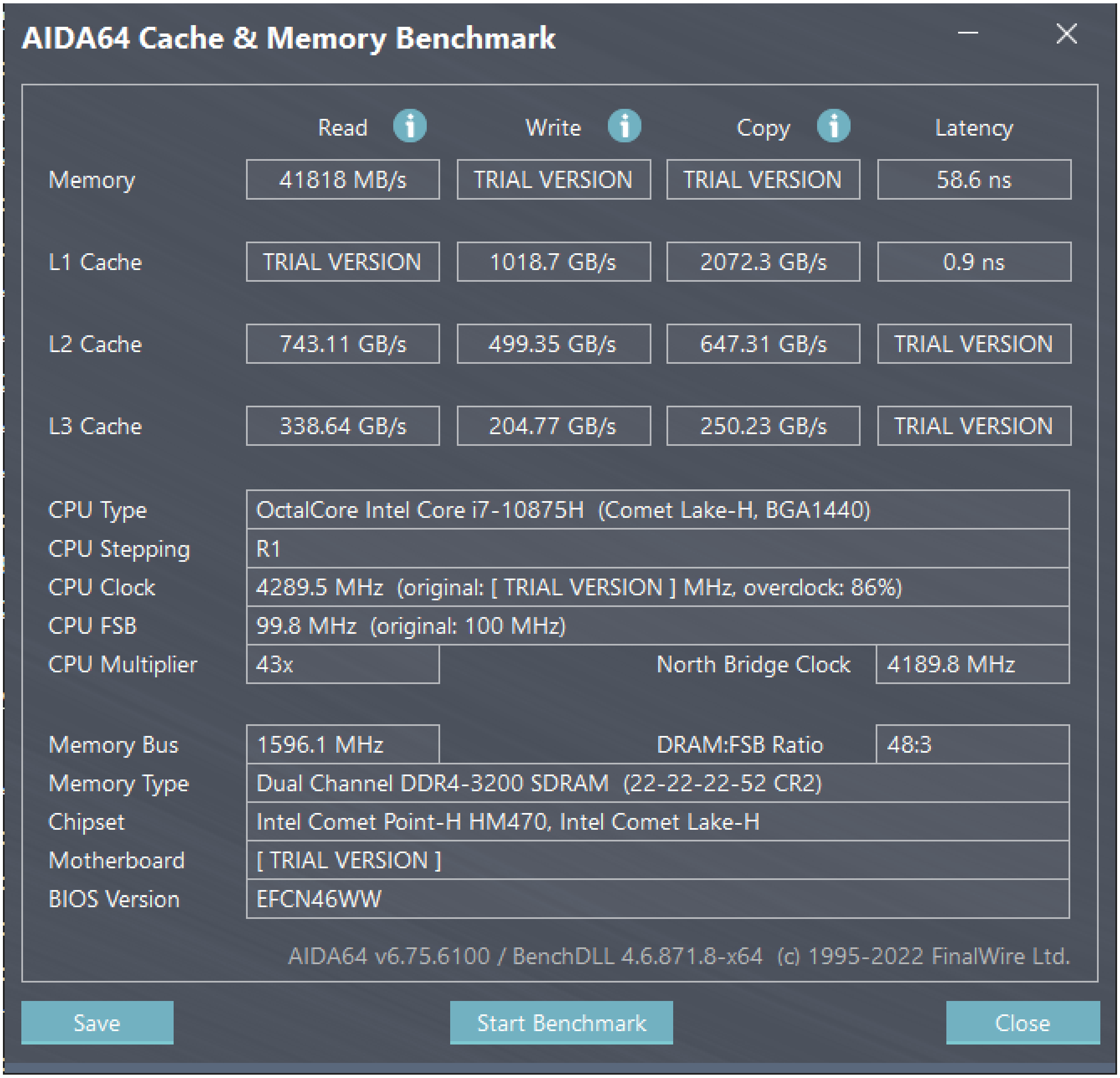
☑ GPU2: Intel(R) UHD Graphics 630
1150 MHz, 96 cores, 24 CUs, Driver 26.20.100.8141

☑ CPU: Intel Core i7-9750H (Coffee Lake-H)
3500 MHz, 6 cores, 12 threads

	2 GPUs	x64 CPU
Memory Read	7005 MB/s	[TRIAL VERSION]
Memory Write	[TRIAL VERSION]	18849 MB/s
Memory Copy	254651 MB/s	19288 MB/s
Single-Precision FLOPS	5879 GFLOPS	[TRIAL VERSION]
Double-Precision FLOPS	270.5 GFLOPS	270.2 GFLOPS
24-bit Integer IOPS	5379 GIOPS	233.0 GIOPS
32-bit Integer IOPS	[TRIAL VERSION]	240.1 GIOPS
64-bit Integer IOPS	1212 GIOPS	41.85 GIOPS
AES-256	15339 MB/s	22447 MB/s
SHA-1 Hash	50097 MB/s	[TRIAL VERSION]
Single-Precision Julia	1619 FPS	[TRIAL VERSION]
Double-Precision Mandel	[TRIAL VERSION]	84.00 FPS

AIDA64 v6.00.5100 (c) 1995-2019 FinalWire Ltd.

在Legion Y7000P2020H的测试结果



AIDA64 Cache & Memory Benchmark

	Read	Write	Copy	Latency
Memory	41818 MB/s	TRIAL VERSION	TRIAL VERSION	58.6 ns
L1 Cache	TRIAL VERSION	1018.7 GB/s	2072.3 GB/s	0.9 ns
L2 Cache	743.11 GB/s	499.35 GB/s	647.31 GB/s	TRIAL VERSION
L3 Cache	338.64 GB/s	204.77 GB/s	250.23 GB/s	TRIAL VERSION

CPU Type	OctalCore Intel Core i7-10875H (Comet Lake-H, BGA1440)		
CPU Stepping	R1		
CPU Clock	4289.5 MHz (original: [TRIAL VERSION] MHz, overclock: 86%)		
CPU FSB	99.8 MHz (original: 100 MHz)		
CPU Multiplier	43x	North Bridge Clock	4189.8 MHz

Memory Bus	1596.1 MHz	DRAM:FSB Ratio	48:3
Memory Type	Dual Channel DDR4-3200 SDRAM (22-22-22-52 CR2)		
Chipset	Intel Comet Point-H HM470, Intel Comet Lake-H		
Motherboard	[TRIAL VERSION]		
BIOS Version	EFCN46WW		

AIDA64 v6.75.6100 / BenchDLL 4.6.871.8-x64 (c) 1995-2022 FinalWire Ltd.

☑ GPU1: NVIDIA GeForce RTX 2060
1200 MHz, 1920 cores, 30 CUs, Driver 472.19

☑ GPU2: Intel(R) UHD Graphics
1200 MHz, 96 cores, 24 CUs, Driver 27.20.100.9664

☑ CPU: Intel Core i7-10875H (Comet Lake-H)
4600 MHz, 8 cores, 16 threads

	2 GPUs	x64 CPU
Memory Read	16617 MB/s	[TRIAL VERSION]
Memory Write	[TRIAL VERSION]	42677 MB/s
Memory Copy	54842 MB/s	37819 MB/s
Single-Precision FLOPS	5841 GFLOPS	[TRIAL VERSION]
Double-Precision FLOPS	299.1 GFLOPS	471.5 GFLOPS
24-bit Integer IOPS	5059 GIOPS	422.3 GIOPS
32-bit Integer IOPS	[TRIAL VERSION]	422.4 GIOPS
64-bit Integer IOPS	1004 GIOPS	68.49 GIOPS
AES-256	16191 MB/s	38944 MB/s
SHA-1 Hash	31714 MB/s	[TRIAL VERSION]
Single-Precision Julia	1419 FPS	[TRIAL VERSION]
Double-Precision Mandel	[TRIAL VERSION]	144.1 FPS

AIDA64 v6.75.6100 (c) 1995-2022 FinalWire Ltd.

实验分析

1. CPU性能公式

$$\text{MIPS} = \frac{\text{指令条数}}{\text{执行时间} \times 10^{6}}$$

$$= \frac{\text{指令条数}}{(\text{所有指令CPU时钟周期数之和} \ / f\ ) \times 10^{6}}$$

$$= \frac{f}{\text{CPI} \times 10^{6}} \qquad \text{（全性能公式）}$$

2. 阿姆达定律

> 首先给出阿姆达尔定律的数学公式描述：
>
> $$S(N) = \frac{1}{(1 - p) + \frac{p}{N}}$$
>
> - p：程序中可并行部分的程序在单核上执行时间的占比；
> - N：处理器的数目（总的核心数）
> - $S(N)$：程序在 N 个处理器（总核心数）相对在单个处理器（单核）中的速度提升比；
>
> 当 $p = 0.8$ (可并行部分所占比较高)，令 $N \rightarrow \infty$，此时 $S(N) \rightarrow 5$ (因采用多核对速度提升的上限)，
> 当 $p = 0.2$ (可并行部分所占比较低)，令 $N \rightarrow \infty$，此时的 $S(N) \rightarrow 1.25$ (因采用多核对速度提升的上限)
>
> 阿姆达尔定律表明，即使到了多核时代，并发程序的开发或者说提升程序的并发度仍然具有十分重要的意义。

可以看到对于电脑的高效运行来说，除了提高电脑CPU的核数，在软件上的开发提高程序的并发性依旧非常重要。