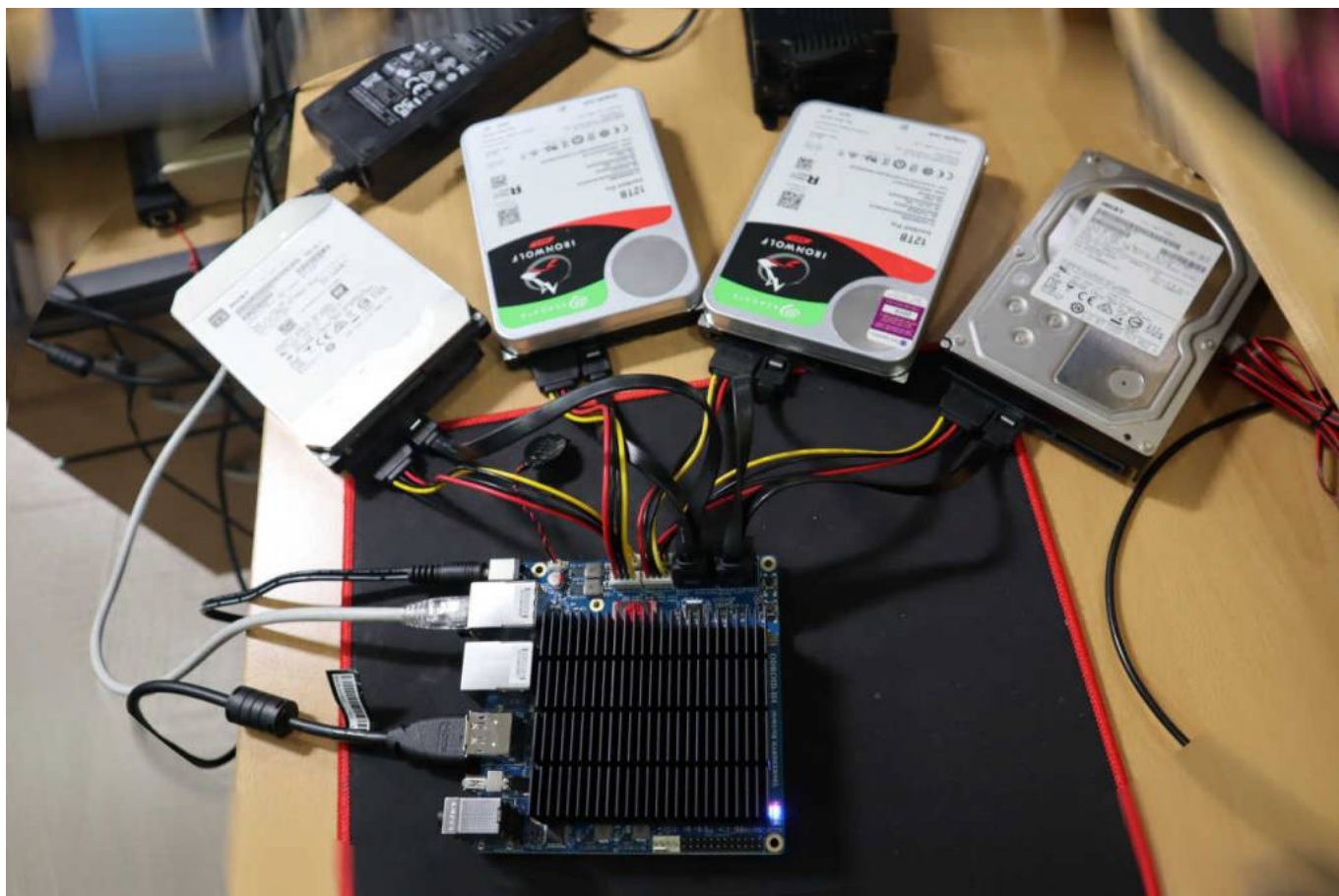


Four Internal SATA Drives

A SATA host controller ASM1064B on ODROID-H4+/H4-Ultra has connected to the CPU via PCIe interface.

And, four SATA Power & Data connectors that are ready to link out of the box on the ODROID-H4+/H4-Ultra.



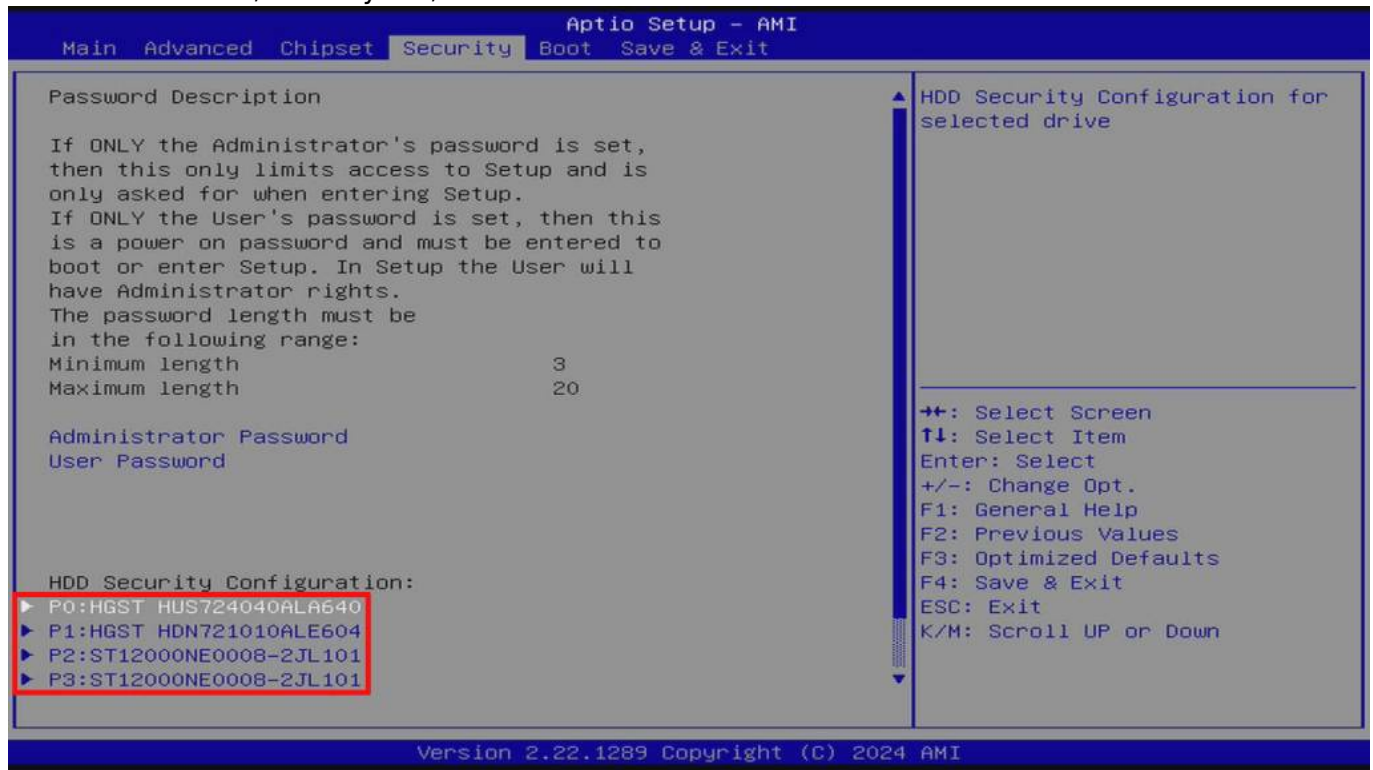
Environments

We have prepared the following items.

- ODROID-H4-Ultra (N-305)
- Samsung DDR5 4800 Mhz
- eMMC 64GB - **Ubuntu 22.04.3 LTS**
- **4 SATA Drives** - Estimated total local storage capacity is about **35TB**
 - 3.5" SEAGATE IRONWOLF 12TB x 2
 - 3.5" HGST 4TB
 - 3.5" HGST 8TB
- [19V/7A Power Supply](#)

Check if it works

In the BIOS screen, Security tab, and show us the model name of the four Hard Disk Drive.



Turn the system on and execute **inxi** to check how it works.

```

odroid@odroid-ODROID-H4:~$ sudo inxi -Fxxx
[sudo] password for odroid:
System:
  Host: odroid-ODROID-H4 Kernel: 6.5.0-15-generic x86_64 bits: 64 compiler: N/A
  Console: pty pts/2 DM: GDM3 42.0 Distro: Ubuntu 22.04.3 LTS (Jammy Jellyfish)
Machine:
  Type: Desktop System: HARDKERNEL product: ODROID-H4 v: 1.0 serial: N/A
  Mobo: HARDKERNEL model: ODROID-H4 v: 1.0 serial: N/A UEFI: American Megatrends LLC. v: 1.0
  date: 01/18/2024
Battery:
  Device-1: hidpp_battery_0 model: Logitech Wireless Touch Keyboard K400 serial: dc-c3-0e-a9
  charge: 100% (should be ignored) rechargeable: yes status: Discharging
CPU:
  Info: 8-core model: Intel Core i3-N305 bits: 64 type: MCP smt: <unsupported> arch: N/A rev: 0
  cache: L1: 768 KiB L2: 4 MiB L3: 6 MiB
  Speed (MHz): avg: 800 min/max: 800/3800 volts: 1.0 V ext-clock: 100 MHz cores: 1: 800 2: 800
  3: 800 4: 800 5: 800 6: 800 7: 800 8: 800 bogomips: 28876
  Flags: avx avx2 ht lm nx pae sse sse2 sse3 sse4_1 sse4_2 ssse3 vmx
Graphics:
  Device-1: Intel driver: i915 v: kernel ports: active: HDMI-A-1
  empty: DP-1, DP-2, HDMI-A-2, HDMI-A-3 bus-ID: 00:02.0 chip-ID: 8086:46d0 class-ID: 0300
  Display: server: X.org v: 1.21.1.4 with: Xwayland v: 22.1.1 compositor: gnome-shell driver:
  gpu: i915 note: X driver n/a tty: 208x58
  Monitor-1: HDMI-A-1 model: AOC 2269WM serial: BEWD99A000009 res: 1920x1080 dpi: 102
  size: 477x268mm (18.8x10.6") diag: 547mm (21.5") modes: max: 1920x1080 min: 720x400
  Message: GL data unavailable in console for root.
Audio:
  Device-1: Intel driver: snd_hda_intel v: kernel bus-ID: 00:1f.3 chip-ID: 8086:54c8
  class-ID: 0403
  Sound Server-1: ALSA v: k6.5.0-15-generic running: yes
  Sound Server-2: PulseAudio v: 15.99.1 running: yes
  Sound Server-3: PipeWire v: 0.3.48 running: yes
Network:
  Device-1: Intel driver: igc v: kernel pcie: speed: 5 GT/s lanes: 1 port: N/A bus-ID: 01:00.0
  chip-ID: 8086:125c class-ID: 0200
  IF: enp1s0 state: down mac: 00:1e:06:45:56:57
  Device-2: Intel driver: igc v: kernel pcie: speed: 5 GT/s lanes: 1 port: N/A bus-ID: 02:00.0
  chip-ID: 8086:125c class-ID: 0200
  IF: enp2s0 state: up speed: 1000 Mbps duplex: full mac: 00:1e:06:45:56:58
Drives:
  Local Storage: total: 34.62 TiB used: 499.71 GiB (1.4%)
  ID-1: /dev/mmcblk0 vendor: SanDisk model: SDW64G size: 58.24 GiB type: SSD serial: 0x0d194f98
  rev: 0x7 scheme: GPT
  ID-2: /dev/sda vendor: HGST (Hitachi) model: HUS724040ALA640 size: 3.64 TiB speed: 6.0 Gb/s
  type: HDD rpm: 7200 serial: PN2331PAKJT7RT rev: AA70 scheme: GPT
  ID-3: /dev/sdb vendor: HGST (Hitachi) model: HDN721010ALE604 size: 9.1 TiB speed: 6.0 Gb/s
  type: HDD rpm: 7200 serial: 7JJZRV7C rev: 83XN scheme: GPT
  ID-4: /dev/sdc vendor: Seagate model: ST12000NE0008-2JL101 size: 10.91 TiB speed: 6.0 Gb/s
  type: HDD rpm: 7200 serial: ZHZ0NCJ6 rev: EN01 scheme: GPT
  ID-5: /dev/sdd vendor: Seagate model: ST12000NE0008-2JL101 size: 10.91 TiB speed: 6.0 Gb/s
  type: HDD rpm: 7200 serial: ZHZ3TXJF rev: EN01 scheme: GPT
Partition:
  ID-1: / size: 56.09 GiB used: 9.52 GiB (17.0%) fs: ext4 dev: /dev/mmcblk0p2
  ID-2: /boot/efi size: 974.1 MiB used: 6.1 MiB (0.6%) fs: vfat dev: /dev/mmcblk0p1
Swap:
  Alert: No swap data was found.
Sensors:
  System Temperatures: cpu: 48.0 C mobo: N/A
  Fan Speeds (RPM): N/A
Info:
  Processes: 289 Uptime: 2m wakeups: 2 Memory: 31.09 GiB used: 1.43 GiB (4.6%) Init: systemd
  v: 249 runlevel: 5 Compilers: gcc: N/A Packages: 1660 apt: 1649 snap: 11 Shell: Sudo (sudo)
  v: 1.9.9 default: Bash v: 5.1.16 running-in: pty pts/2 (SSH) inxi: 3.3.13

```

Looks great, H4 recognizes all 4 SATA drives **from sda to sdd** and estimated total local storage capacity is **34.62TiB**.

Performance test

Run for each drive

target

```
root@odroid-ODROID-H4:/media/odroid# mount | grep sd[a-d] | sort
/dev/sda1 on /media/odroid/929860b8-e6c8-4d8f-b074-b691411c0f0a type
ext4 (rw,nosuid,nodev,relatime,errors=remount-ro,uhelper=udisks2)
/dev/sdb2 on /media/odroid/164e1dca-5778-470f-894c-8108eaae3d92 type
ext4 (rw,nosuid,nodev,relatime,errors=remount-ro,uhelper=udisks2)
/dev/sdc1 on /media/odroid/d7315356-973f-40cf-acbd-838607220d63 type
ext4 (rw,nosuid,nodev,relatime,errors=remount-ro,uhelper=udisks2)
/dev/sdd1 on /media/odroid/eb25cad4-8a26-4640-ac84-b25201c8900e type
ext4 (rw,nosuid,nodev,relatime,errors=remount-ro,uhelper=udisks2)
```

Run iozone command with these options in the below.

target

```
$ sudo iozone -e -I -a -s 100M -r 4k -r 16k -r 512k -r 1024k -r 16384k
-i 0 -i 1 -i 2
```

target

```
root@odroid-ODROID-H4:/media/odroid/929860b8-e6c8-4d8f-b074-
b691411c0f0a# iozone -e -I -a -s 100M -r 4k -r 16k -r 512k -r 1024k -r
16384k -i 0 -i 1 -i 2
    Iozone: Performance Test of File I/O
          Version $Revision: 3.489 $
          Compiled for 64 bit mode.
          Build: linux-AMD64

    Contributors:William Norcott, Don Capps, Isom Crawford, Kirby
Collins
                  Al Slater, Scott Rhine, Mike Wisner, Ken Goss
                  Steve Landherr, Brad Smith, Mark Kelly, Dr. Alain
CYR,
                  Randy Dunlap, Mark Montague, Dan Million, Gavin
Brebner,
                  Jean-Marc Zucconi, Jeff Blomberg, Benny Halevy,
Dave Boone,
                  Erik Habbinga, Kris Strecker, Walter Wong, Joshua
Root,
                  Fabrice Bacchella, Zhenghua Xue, Qin Li, Darren
Sawyer,
                  Vangel Bojaxhi, Ben England, Vikentsi Lapa,
                  Alexey Skidanov, Sudhir Kumar.
```

```
Run began: Tue Feb 13 12:26:56 2024

Include fsync in write timing
O_DIRECT feature enabled
Auto Mode
File size set to 102400 kB
Record Size 4 kB
Record Size 16 kB
Record Size 512 kB
Record Size 1024 kB
Record Size 16384 kB
Command line used: iotest -e -I -a -s 100M -r 4k -r 16k -r 512k
-r 1024k -r 16384k -i 0 -i 1 -i 2
Output is in kBytes/sec
Time Resolution = 0.000001 seconds.
Processor cache size set to 1024 kBytes.
Processor cache line size set to 32 bytes.
File stride size set to 17 * record size.
```

	random						random
		bkwd	record	stride			
		kB	reclen	write	rewrite	read	reread
write		read	rewrite	read	fwrite	frewrite	fread
		102400	4	44035	45696	56520	57176
1926							
		102400	16	126654	148195	159380	165089
8275							
		102400	512	164041	161921	147089	152276
83950							
		102400	1024	164034	164060	147713	153104
108559							
		102400	16384	161882	164792	165407	171748
160289							

```
iotest complete.
```

target

```
root@odroid-ODROID-
H4:/media/odroid/164e1dca-5778-470f-894c-8108eaae3d92# iotest -e -I -a
-s 100M -r 4k -r 16k -r 512k -r 1024k -r 16384k -i 0 -i 1 -i 2
./.
```

	random						random
		bkwd	record	stride			
		kB	reclen	write	rewrite	read	reread
write		read	rewrite	read	fwrite	frewrite	fread
		102400	4	74947	71339	110512	149560
3800							
		102400	16	39727	189140	204357	239501
15445							
		102400	512	50284	234430	236276	249286

```
137073
      102400      1024      182047      222732      236820      259230      118767
105664
      102400      16384      224774      238949      239591      251000      234686
218358

iozone test complete.
```

target

```
root@odroid-ODROID-H4:/media/odroid/d7315356-973f-40cf-
acbd-838607220d63# iotest -e -I -a -s 100M -r 4k -r 16k -r 512k -r
1024k -r 16384k -i 0 -i 1 -i 2
./.
```

	random						random
random		bkwd	record	stride			
		kB	reclen	write	rewrite	read	reread
write		read	rewrite	read	fwrite	frewrite	fread
		102400	4	64682	65057	74791	68615
3931							
		102400	16	130727	153801	184774	189965
15194							
		102400	512	195236	228037	232394	239883
137908							
		102400	1024	212213	227950	233125	241240
143271							
		102400	16384	211430	224425	229754	242764
212811							

iozone test complete.

target

```
root@odroid-ODROID-H4:/media/odroid/eb25cad4-8a26-4640-ac84-
b25201c8900e# iotest -e -I -a -s 100M -r 4k -r 16k -r 512k -r 1024k -r
16384k -i 0 -i 1 -i 2
./.
```

	random						random
random		bkwd	record	stride			
		kB	reclen	write	rewrite	read	reread
write		read	rewrite	read	fwrite	frewrite	fread
		102400	4	64358	68677	69979	73034
4657							
		102400	16	136608	163960	176325	193505
19764							
		102400	512	205181	205119	226249	238682
145658							
		102400	1024	195358	212211	217068	230562
169626							

102400 16384 207489 216340 218291 230257 214942
206745
iozone test complete.

Run in parallel

```

root@odroid-ODROID-H4: /media/odroid
42953036288 bytes (43 GB, 40 GiB) copied, 157 s, 274 MB/s
43131556352 bytes (43 GB, 40 GiB) copied, 158 s, 273 MB/s
43313615360 bytes (43 GB, 40 GiB) copied, 159 s, 272 MB/s
43504587264 bytes (44 GB, 41 GiB) copied, 160 s, 272 MB/s
43693503488 bytes (44 GB, 41 GiB) copied, 161 s, 271 MB/s
43882229568 bytes (44 GB, 41 GiB) copied, 162 s, 271 MB/s
44071008480 bytes (44 GB, 41 GiB) copied, 163 s, 270 MB/s
44259868160 bytes (44 GB, 41 GiB) copied, 164 s, 270 MB/s
44448728320 bytes (44 GB, 41 GiB) copied, 165 s, 269 MB/s
44637588480 bytes (45 GB, 42 GiB) copied, 166 s, 269 MB/s
44826448640 bytes (45 GB, 42 GiB) copied, 167 s, 268 MB/s
45015308800 bytes (45 GB, 42 GiB) copied, 168 s, 268 MB/s
45204168960 bytes (45 GB, 42 GiB) copied, 169 s, 267 MB/s
45393029120 bytes (45 GB, 42 GiB) copied, 170 s, 267 MB/s
45581889280 bytes (46 GB, 43 GiB) copied, 171 s, 266 MB/s
45770749440 bytes (46 GB, 43 GiB) copied, 172 s, 266 MB/s
45959609600 bytes (46 GB, 43 GiB) copied, 173 s, 265 MB/s
46148469760 bytes (46 GB, 43 GiB) copied, 174 s, 265 MB/s
46337329920 bytes (46 GB, 43 GiB) copied, 175 s, 264 MB/s
46526190080 bytes (46 GB, 43 GiB) copied, 176 s, 264 MB/s
46715050240 bytes (47 GB, 43 GiB) copied, 177 s, 263 MB/s
46903910400 bytes (47 GB, 44 GiB) copied, 178 s, 263 MB/s
47092770560 bytes (47 GB, 44 GiB) copied, 179 s, 262 MB/s
47281630720 bytes (47 GB, 44 GiB) copied, 180 s, 262 MB/s
47470490880 bytes (47 GB, 44 GiB) copied, 181 s, 261 MB/s
47659351040 bytes (48 GB, 44 GiB) copied, 182 s, 261 MB/s
47848211200 bytes (48 GB, 44 GiB) copied, 183 s, 261 MB/s
48037071360 bytes (48 GB, 45 GiB) copied, 184 s, 260 MB/s
48225931520 bytes (48 GB, 45 GiB) copied, 185 s, 260 MB/s
48414791680 bytes (48 GB, 45 GiB) copied, 186 s, 259 MB/s
48603651840 bytes (48 GB, 45 GiB) copied, 187 s, 259 MB/s
48792512000 bytes (49 GB, 45 GiB) copied, 188 s, 259 MB/s
48981372160 bytes (49 GB, 45 GiB) copied, 189 s, 258 MB/s
49170232320 bytes (49 GB, 46 GiB) copied, 190 s, 258 MB/s
49359092480 bytes (49 GB, 46 GiB) copied, 191 s, 257 MB/s
49547952640 bytes (49 GB, 46 GiB) copied, 192 s, 257 MB/s
49736812800 bytes (50 GB, 46 GiB) copied, 193 s, 257 MB/s
49925672960 bytes (50 GB, 46 GiB) copied, 194 s, 256 MB/s
50114533120 bytes (50 GB, 46 GiB) copied, 195 s, 256 MB/s

root@odroid-ODROID-H4: /media/odroid
38550004224 bytes (39 GB, 36 GiB) copied, 153 s, 252 MB/s
38739067392 bytes (39 GB, 36 GiB) copied, 154 s, 252 MB/s
38928130560 bytes (39 GB, 36 GiB) copied, 155 s, 252 MB/s
39117193728 bytes (39 GB, 37 GiB) copied, 156 s, 252 MB/s
39306256896 bytes (40 GB, 37 GiB) copied, 157 s, 252 MB/s
39495320064 bytes (40 GB, 37 GiB) copied, 158 s, 252 MB/s
39684383232 bytes (40 GB, 37 GiB) copied, 159 s, 252 MB/s
39873446400 bytes (40 GB, 37 GiB) copied, 160 s, 251 MB/s
40062509568 bytes (40 GB, 37 GiB) copied, 161 s, 251 MB/s
40251572736 bytes (40 GB, 37 GiB) copied, 162 s, 251 MB/s
40440635904 bytes (40 GB, 38 GiB) copied, 163 s, 251 MB/s
40629699072 bytes (41 GB, 38 GiB) copied, 164 s, 251 MB/s
40818762240 bytes (41 GB, 38 GiB) copied, 165 s, 251 MB/s
41007825408 bytes (41 GB, 38 GiB) copied, 166 s, 251 MB/s
41196888576 bytes (41 GB, 39 GiB) copied, 167 s, 251 MB/s
41385951744 bytes (42 GB, 39 GiB) copied, 168 s, 251 MB/s
41575014912 bytes (42 GB, 39 GiB) copied, 169 s, 251 MB/s
41764078080 bytes (42 GB, 39 GiB) copied, 170 s, 251 MB/s
41953141248 bytes (42 GB, 40 GiB) copied, 171 s, 251 MB/s
42142204416 bytes (43 GB, 40 GiB) copied, 172 s, 251 MB/s
42331267584 bytes (43 GB, 40 GiB) copied, 173 s, 251 MB/s
42520330752 bytes (43 GB, 40 GiB) copied, 174 s, 251 MB/s
42709393920 bytes (44 GB, 41 GiB) copied, 175 s, 251 MB/s
42898457088 bytes (44 GB, 41 GiB) copied, 176 s, 251 MB/s
43087520256 bytes (44 GB, 41 GiB) copied, 177 s, 251 MB/s
43276583424 bytes (44 GB, 41 GiB) copied, 178 s, 251 MB/s
43465646592 bytes (45 GB, 42 GiB) copied, 179 s, 251 MB/s
43654709760 bytes (45 GB, 42 GiB) copied, 180 s, 251 MB/s
43843772928 bytes (45 GB, 42 GiB) copied, 181 s, 251 MB/s
44032836096 bytes (46 GB, 42 GiB) copied, 182 s, 251 MB/s
44221899264 bytes (46 GB, 42 GiB) copied, 183 s, 250 MB/s
44410962432 bytes (46 GB, 43 GiB) copied, 184 s, 250 MB/s
44599025600 bytes (46 GB, 43 GiB) copied, 185 s, 250 MB/s
44788088768 bytes (47 GB, 43 GiB) copied, 186 s, 250 MB/s
44977151936 bytes (47 GB, 44 GiB) copied, 187 s, 250 MB/s
45166215104 bytes (47 GB, 44 GiB) copied, 188 s, 250 MB/s
45355278272 bytes (47 GB, 44 GiB) copied, 189 s, 250 MB/s
45544341440 bytes (48 GB, 44 GiB) copied, 190 s, 250 MB/s
45733404608 bytes (48 GB, 44 GiB) copied, 191 s, 250 MB/s

root@odroid-ODROID-H4: /media/odroid
24310260224 bytes (24 GB, 23 GiB) copied, 102 s, 238 MB/s
24501323392 bytes (25 GB, 23 GiB) copied, 103 s, 238 MB/s
24692386560 bytes (25 GB, 23 GiB) copied, 104 s, 238 MB/s
24883449728 bytes (25 GB, 23 GiB) copied, 105 s, 238 MB/s
25074512896 bytes (25 GB, 24 GiB) copied, 106 s, 238 MB/s
25265576064 bytes (25 GB, 24 GiB) copied, 107 s, 238 MB/s
25456639232 bytes (26 GB, 24 GiB) copied, 108 s, 238 MB/s
25647702400 bytes (26 GB, 24 GiB) copied, 109 s, 238 MB/s
25838765568 bytes (26 GB, 25 GiB) copied, 110 s, 238 MB/s
26029828736 bytes (26 GB, 25 GiB) copied, 111 s, 238 MB/s
26220891904 bytes (27 GB, 25 GiB) copied, 112 s, 238 MB/s
26411955072 bytes (27 GB, 25 GiB) copied, 113 s, 238 MB/s
26603018240 bytes (27 GB, 25 GiB) copied, 114 s, 238 MB/s
26794081408 bytes (27 GB, 25 GiB) copied, 115 s, 238 MB/s
26985144576 bytes (28 GB, 26 GiB) copied, 116 s, 237 MB/s
27176207744 bytes (28 GB, 26 GiB) copied, 117 s, 237 MB/s
27367270912 bytes (28 GB, 26 GiB) copied, 118 s, 237 MB/s
27558334080 bytes (28 GB, 26 GiB) copied, 119 s, 237 MB/s
27749397248 bytes (28 GB, 27 GiB) copied, 120 s, 237 MB/s
27940460416 bytes (29 GB, 27 GiB) copied, 121 s, 237 MB/s
28131523584 bytes (29 GB, 27 GiB) copied, 122 s, 237 MB/s
28322586752 bytes (29 GB, 27 GiB) copied, 123 s, 237 MB/s
28513649920 bytes (29 GB, 27 GiB) copied, 124 s, 237 MB/s
28704713088 bytes (30 GB, 28 GiB) copied, 125 s, 237 MB/s
28895776256 bytes (30 GB, 28 GiB) copied, 126 s, 237 MB/s
29086839424 bytes (30 GB, 28 GiB) copied, 127 s, 237 MB/s
29277902592 bytes (30 GB, 28 GiB) copied, 128 s, 237 MB/s
29468965760 bytes (31 GB, 28 GiB) copied, 129 s, 237 MB/s
29660028928 bytes (31 GB, 29 GiB) copied, 130 s, 237 MB/s
29851092096 bytes (31 GB, 29 GiB) copied, 131 s, 237 MB/s
29942155264 bytes (31 GB, 29 GiB) copied, 132 s, 236 MB/s
30133218432 bytes (31 GB, 29 GiB) copied, 133 s, 236 MB/s
30324281600 bytes (32 GB, 30 GiB) copied, 134 s, 236 MB/s
30515344768 bytes (32 GB, 30 GiB) copied, 135 s, 236 MB/s
30706407936 bytes (32 GB, 30 GiB) copied, 136 s, 236 MB/s
30897471104 bytes (32 GB, 30 GiB) copied, 137 s, 236 MB/s
31088534272 bytes (33 GB, 31 GiB) copied, 138 s, 236 MB/s
31279597440 bytes (33 GB, 31 GiB) copied, 139 s, 236 MB/s
31470660608 bytes (33 GB, 31 GiB) copied, 140 s, 236 MB/s

root@odroid-ODROID-H4: /media/odroid
11621442048 bytes (12 GB, 11 GiB) copied, 50 s, 232 MB/s
11812505216 bytes (12 GB, 11 GiB) copied, 51 s, 232 MB/s
12003568384 bytes (12 GB, 11 GiB) copied, 52 s, 232 MB/s
12194631552 bytes (12 GB, 11 GiB) copied, 53 s, 232 MB/s
12385694720 bytes (13 GB, 12 GiB) copied, 54 s, 232 MB/s
12576757888 bytes (13 GB, 12 GiB) copied, 55 s, 232 MB/s
12767821056 bytes (13 GB, 12 GiB) copied, 56 s, 232 MB/s
12958884224 bytes (13 GB, 12 GiB) copied, 57 s, 232 MB/s
13149947392 bytes (13 GB, 13 GiB) copied, 58 s, 232 MB/s
13341010560 bytes (14 GB, 13 GiB) copied, 59 s, 232 MB/s
13532073728 bytes (14 GB, 13 GiB) copied, 60 s, 232 MB/s
13723136896 bytes (14 GB, 13 GiB) copied, 61 s, 232 MB/s
13914199072 bytes (14 GB, 13 GiB) copied, 62 s, 232 MB/s
14105262240 bytes (15 GB, 14 GiB) copied, 63 s, 232 MB/s
14296325408 bytes (15 GB, 14 GiB) copied, 64 s, 232 MB/s
14487388576 bytes (15 GB, 14 GiB) copied, 65 s, 232 MB/s
14678451744 bytes (15 GB, 14 GiB) copied, 66 s, 232 MB/s
14869514912 bytes (16 GB, 14 GiB) copied, 67 s, 232 MB/s
15060578080 bytes (16 GB, 15 GiB) copied, 68 s, 232 MB/s
15251641248 bytes (16 GB, 15 GiB) copied, 69 s, 232 MB/s
15442704416 bytes (16 GB, 15 GiB) copied, 70 s, 232 MB/s
15633767584 bytes (16 GB, 15 GiB) copied, 71 s, 232 MB/s
15824830752 bytes (17 GB, 16 GiB) copied, 72 s, 232 MB/s
16015893920 bytes (17 GB, 16 GiB) copied, 73 s, 232 MB/s
16206957088 bytes (17 GB, 16 GiB) copied, 74 s, 232 MB/s
16398020256 bytes (17 GB, 16 GiB) copied, 75 s, 232 MB/s
16589083424 bytes (18 GB, 16 GiB) copied, 76 s, 232 MB/s
16780146592 bytes (18 GB, 17 GiB) copied, 77 s, 232 MB/s
16971209760 bytes (18 GB, 17 GiB) copied, 78 s, 232 MB/s
17162272928 bytes (18 GB, 17 GiB) copied, 79 s, 232 MB/s
17353336096 bytes (19 GB, 17 GiB) copied, 80 s, 232 MB/s
17544399264 bytes (19 GB, 18 GiB) copied, 81 s, 232 MB/s
17735462432 bytes (19 GB, 18 GiB) copied, 82 s, 232 MB/s
17926525600 bytes (19 GB, 18 GiB) copied, 83 s, 232 MB/s
18117588768 bytes (20 GB, 18 GiB) copied, 84 s, 232 MB/s
18308651936 bytes (20 GB, 18 GiB) copied, 85 s, 232 MB/s
18499715104 bytes (20 GB, 19 GiB) copied, 86 s, 232 MB/s
18690778272 bytes (20 GB, 19 GiB) copied, 87 s, 232 MB/s
18881841440 bytes (20 GB, 19 GiB) copied, 88 s, 233 MB/s

```

To test its performance and stability, run dd with this command.

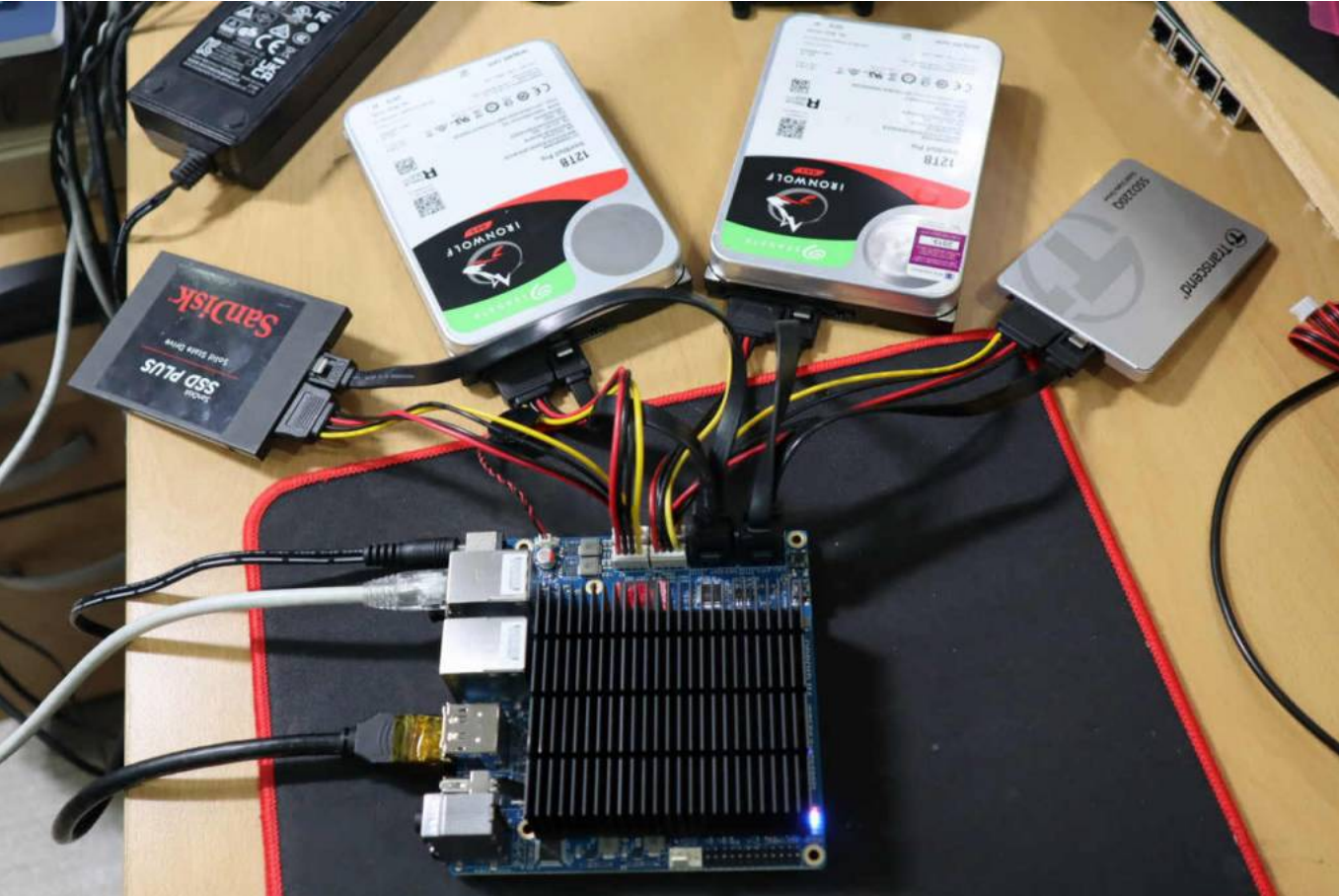
target

```
$ sudo dd if=/dev/sd? of=/dev/null status=progress
```


We can see the transfer speed in real time with **status=progress** option.
It shows us a minimum 230 MB/s in parallel.

With two SSD

Replace to two Solid State Drive like the below picture.



target

```
root@odroid-ODROID-H4:/media/odroid/9CB68D99B68D7514# iotop -e -I -a -s 100M -r 4k -r 16k -r 512k -r 1024k -r 16384k -i 0 -i 1 -i 2
./.
```

random	bkwd	record	stride	random
write	read	reclen	write	read
	read	rewrite	read	rewrite
37962	102400	4	36760	38526
91308	102400	16	116343	123752
258497	102400	512	321043	343507
283055	102400	1024	339471	358110
388220	102400	16384	170697	439102

iozone test complete.

target

```
root@odroid-ODROID-H4:/media/odroid/3662a25d-ed88-4698-ble6-4b89d3181d13# iozone -e -I -a -s 100M -r 4k -r 16k -r 512k -r 1024k -r 16384k -i 0 -i 1 -i 2
./.
```

	random						random
	bkwd	record	stride				
	kB	reclen	write	rewrite	read	reread	read
write	read	rewrite	read	fwrite	frewrite	fread	freread
	102400	4	77676	76751	88256	130415	20778
105890							
	102400	16	147189	167753	199845	202421	60393
188911							
	102400	512	356986	370352	417826	427272	328293
367770							
	102400	1024	383766	401353	461354	463564	394745
392410							
	102400	16384	456323	473231	538088	542301	527721
426183							

iozone test complete.

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