



??????????

- `--bs=4k` → 4K [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] IOPS
- `--rw=randread` [ ] `randwrite` → [ ] [ ] / [ ]
- `--numjobs=4` → [ ] [ ] 4 [ ] [ ] [ ] [ ] CPU [ ] [ ]
- `--iodepth=32` → [ ] [ ] [ ] [ ]
- `--direct=1` → [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
- `--runtime=30` → [ ] [ ] 30 [ ]
- `--group_reporting` → [ ] [ ] [ ] [ ]

## ? ? IOPS ??????????????????????

[ ] [ ] NVMe / RAID / SSD [ ]

```
# [ ] [ ] 4k [ ] [ ] [ ] [ ]
fio --name=max-iops --filename=/home/testfile --size=4G \
--rw=randread --bs=4k --numjobs=8 --iodepth=64 --direct=1 \
--time_based --runtime=60 --ioengine=libaio --group_reporting

# [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] HDD
fio --name=test --filename=/home/testfile --size=4G \
--rw=randread --bs=64k --numjobs=4 --iodepth=16 \
--direct=1 --runtime=60 --ioengine=libaio --group_reporting

# [ ] [ ] [ ] [ ] MySQL / [ ] [ ] [ ] [ ]
fio --name=real-write \
--filename=/home/testfile \
--size=10G \
--rw=randwrite \
--bs=4k \
--numjobs=4 \
--iodepth=16 \
--direct=1 \
--time_based \
--runtime=60 \
--ioengine=libaio \
--group_reporting
```







# Fixed VHDX vs Dynamic VHDX

Fixed VHDX

- 100GB
- 1GB
- 10GB

Dynamic VHDX Fixed-size VHDX 1.5TB 3TB

---

# Write-Back Cache

Write-Back Cache

✓ "Enable write caching"

Windows

✓ "Enable write caching"

✓ "Windows" "Write-Back Cache"

20-100% IOPS

---

# SCSI vs IDE

fio 17k IOPS SCSI

IDE → SCSI

✓ IDE = 100MB/s

✓ SCSI (VHBA) = 1000MB/s

---

# Hyper-V + fio jobs

Hyper-V VHDX

||||

- || 4 || VHDX
- |||
- fio |||

IOPS |||

---

# ? ??? BIOS ?? NVMe ? ASPM + ?????

BIOS |||

- NVMe ASPM → off || L0s/L1 ||
  - PCIe Active State Power Management → off
  - CPU C-states → off
  - CPU performance → high performance
- 

# ? ??? OS ??? fio ??

|||

```
iodepth=64  
numjobs=8
```

|||||

```
--iodepth=128 --numjobs=16 --ioengine=io_uring
```

||||| (uname -r 5.4+ || io\_uring)

**io\_uring IOPS || libaio || 20 || 200%**

---

# ? ?????? NVMe ????????

|||| 17k IOPS |||

