

Local NVMe Storage Acceleration Solution with Intel FPGA

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Local NVMe Storage in Cloud

- ▶ Compared with EBS/CBS, local storage are physically attached to the host CPU and provide temporary block-level storage.
- ▶ Ideal for temporary storage of information that changes frequently.

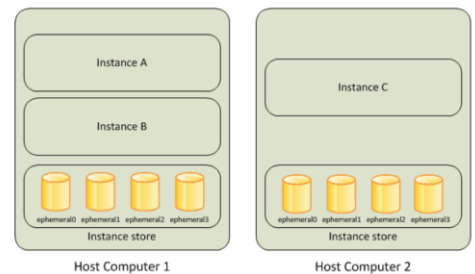
Amazon EC2 instance store

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An *instance store* provides temporary block-level storage for your instance. This storage is located on disks that are physically attached to the host computer. Instance store is ideal for temporary storage of information that changes frequently, such as buffers, caches, scratch data, and other temporary content, or for data that is replicated across a fleet of instances, such as a load-balanced pool of web servers.

An instance store consists of one or more instance store volumes exposed as block devices. The size of an instance store as well as the number of devices available varies by instance type.

The virtual devices for instance store volumes are `ephemeral[0-23]`. Instance types that support one instance store volume have `ephemeral0`. Instance types that support two instance store volumes have `ephemeral0` and `ephemeral1`, and so on.



Alibaba Cloud

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搜索帮助内容

本地盘

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① 本文中含有需要您注意的重要提示信息, 忽略该信息可能对您的业务造成影响, 请务必仔细阅读。

本地盘是ECS实例所在物理机上的本地硬盘设备。本地盘能够为ECS实例提供本地存储访问能力, 具有低时延、高随机IOPS、高吞吐量和高性价比的优势。

注意事项

- 本地盘来自单台物理机, 数据可靠性取决于物理机的可靠性, 存在单点故障风险。

警告

使用本地盘存储数据有丢失数据的风险。例如ECS实例所在物理机发生硬件故障时, 请勿在本地盘上存储需要长期保存的业务数据。
 - 建议您在应用层做数据冗余, 保证数据的可用性。您可以使用部署集将业务涉及到的几台ECS实例分散部署在不同的物理服务器上, 保证业务的可用性。
 - 如果您的应用无数据可靠性架构设计, 强烈建议您在ECS实例中间时使用云盘或者备份服务, 提高数据可靠性。更多信息, 请参见云盘概述或备份服务。
- 购买了带本地盘的ECS实例后, 请登录ECS实例自行分区并格式化本地盘。具体操作, 请参见分区格式化数据盘 (Linux) 或分区格式化数据盘 (Windows)
- 本地盘不支持的操作有:
 - 单独创建全新本地盘
 - 使用快照创建本地盘
 - 挂载本地盘
 - 单独卸载并释放本地盘
 - 扩容本地盘
 - 重新初始化本地盘
 - 为本地盘创建快照
 - 使用快照回滚本地盘

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本地盘

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本地盘概述

本地盘是与云服务器 (Cloud Virtual Machine, CVM) 实例处于同一台物理服务器上的存储设备, 具有高读写 I/O、低时延的特性。本地盘来自 CVM 实例所在物理机的本地存储, 是从 CVM 实例所在的物理机上划分的一块存储区域 (当前仅部分高 IO 机型及大数据机型支持)。本地盘来自单台物理机, 数据可靠性取决于物理机的可靠性, 存在单点故障风险。

注意

- 当实例所在物理机发生硬件故障时, 本地盘有丢失数据的风险。建议您在应用层做数据冗余保证数据可用性。如果您的应用无数据可靠性架构设计, 建议您在实例中间时使用云硬盘, 提高数据可靠性。
- 对于仅购买本地盘的云服务器不支持硬件 (CPU、内存、硬盘) 的升级, 仅支持带宽的升级。

适用场景

- IO 密集型应用:** 大型关系数据库、NoSQL、ElasticSearch 等 IO 密集型应用, 对存储延时要求低, 可使用高 IO 型云服务器自带的 NVME SSD 本地盘类型, 但需注意单点故障风险。
- 大数据型业务:** EMR 等大数据处理业务, 本身对延迟不敏感, 且上层有数据冗余, 可以容忍单点数据故障, 可使用大数据型云服务器自带的 SATA HDD 本地盘类型。

生命周期

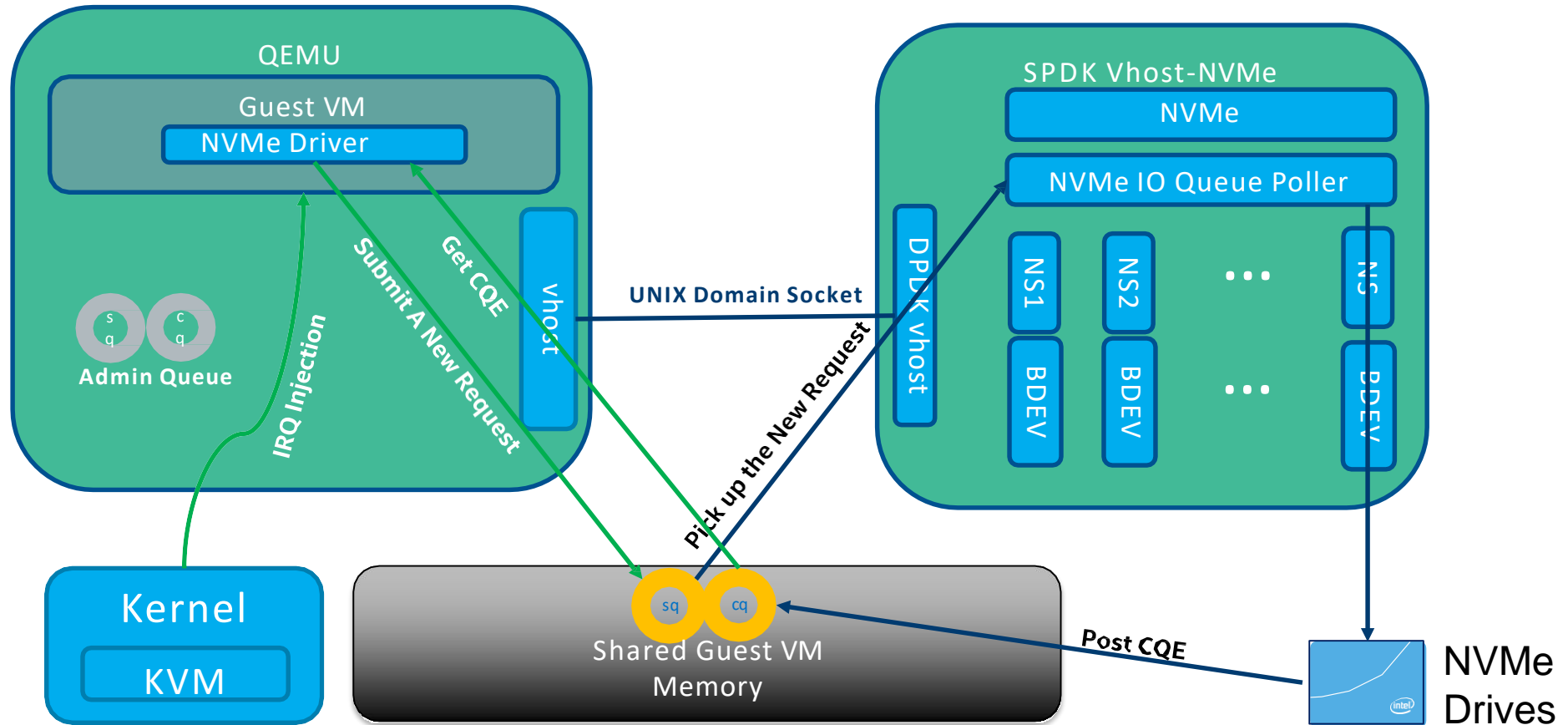
本地盘的生命周期与所挂载的云服务器实例一样。简单理解, 本地盘跟随所挂载的云服务器启动而启动, 结束而结束。

类型

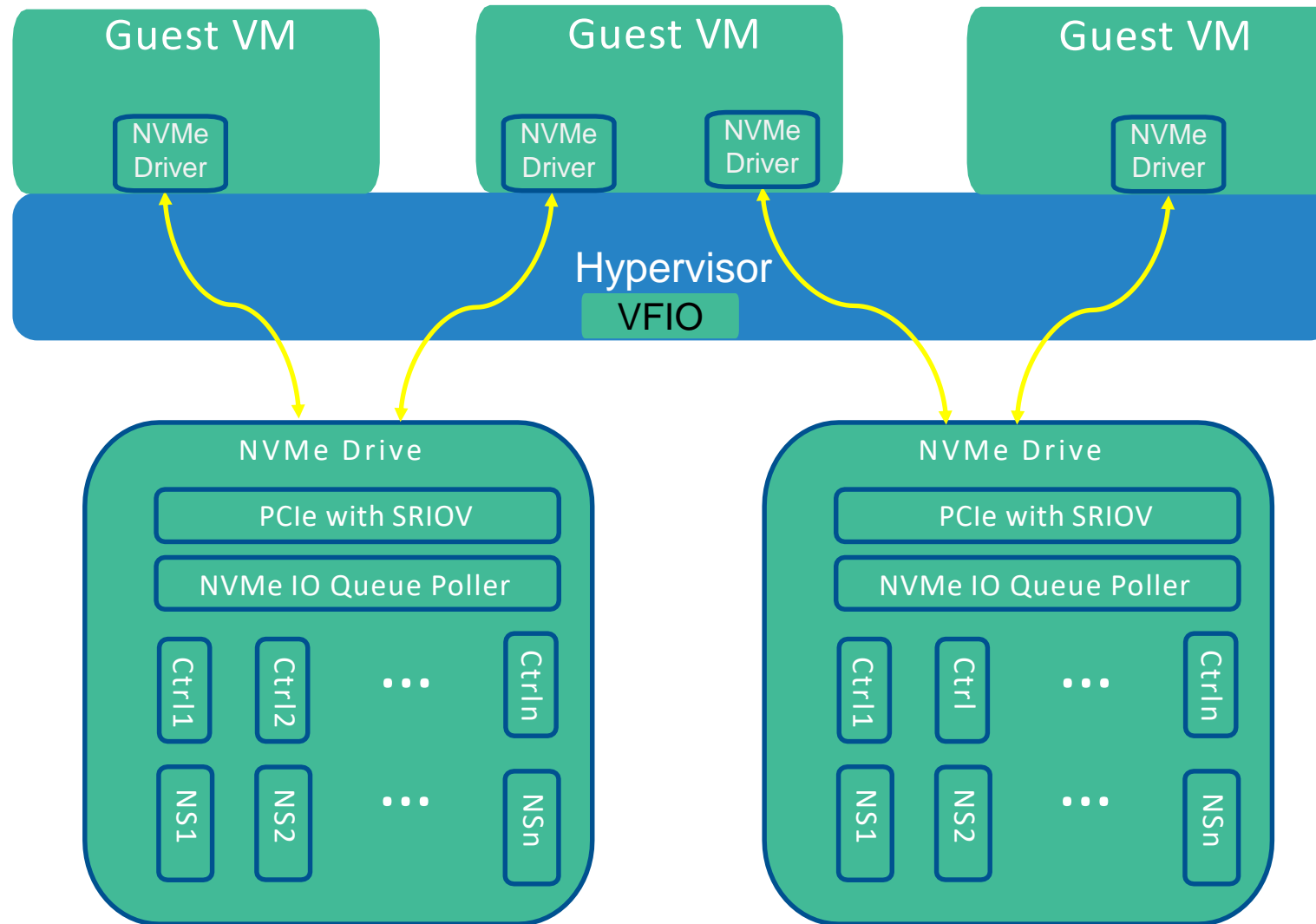
本地盘是来自挂载的云服务器实例所在物理机的本地存储, 按介质不同可以分为 SATA HDD 本地盘和 NVME SSD 本地盘。

CVM 类型	规格及性能
SATA HDD 本地盘	大数据机型
NVME SSD 本地盘	高 IO 机型

SPDK vhost NVMe



SRIOV



Comparison

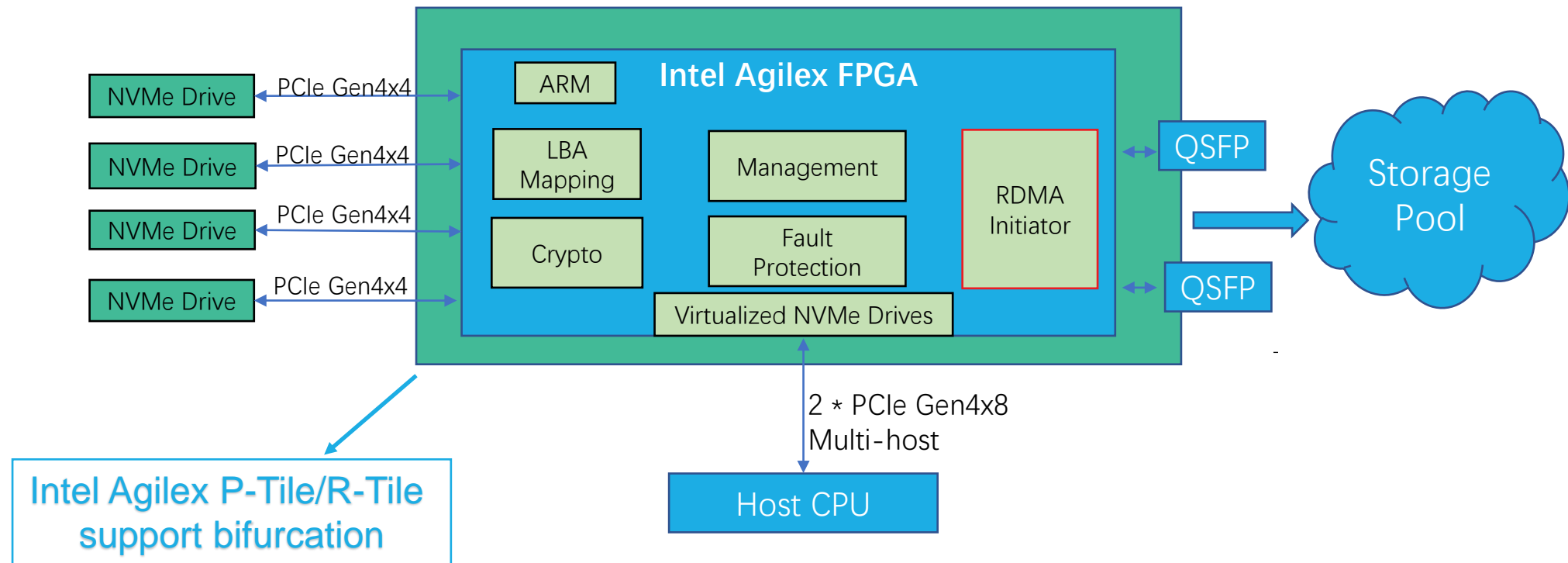
SPDK vhost

- High CPU utilization
- High latency
- No encryption
- No hardware failure isolation

SRIOV

- NVMe drives must support SRIOV, high cost
- Weak SLA ensurance
- No encryption support
- No hardware failure isolation

What Wisewave Solution Is



Features Enhanced

- ▶ Up to 64 virtualized NVMe endpoint devices
 - Better compatibility for legacy NVMe driver
 - Manageable quota allocation for each virtualized NVMe devices
 - Could be many more if needed
- ▶ Support line rate AES-256 encryption/decryption
 - Each virtualized NVMe drive has its own key
- ▶ Failure Isolation
 - Avoid server hang-up caused by NVMe drives' failure
- ▶ 4K SQ/CQ pairs and 4K interrupts
 - 64 Queue Pairs for each devices.
 - Each CQ has its own interrupt.



Added latency
< 2us

More Important

- ▶ Remote storage Could be presented as local NVMe drives
 - Leverage RDMA technology and infinite remote storage pool
 - Tiered storage
- ▶ Hybrid Acceleration Platform for Storage
 - Could present a Endpoint for a specific storage acceleration service.
- ▶ Wisewave's in-house IPs with competitive Fmax/resource utilization
 - **WDMA**
 - **PCIe RC Bridge**
 - Encryption/Decryption(Soft)
 - Erasure Coding with any K/P set
 - RDMA(in developing)

Could run 500MHz on Intel's Agilex -3 device even ECC is enabled

数据中心光电网络互联

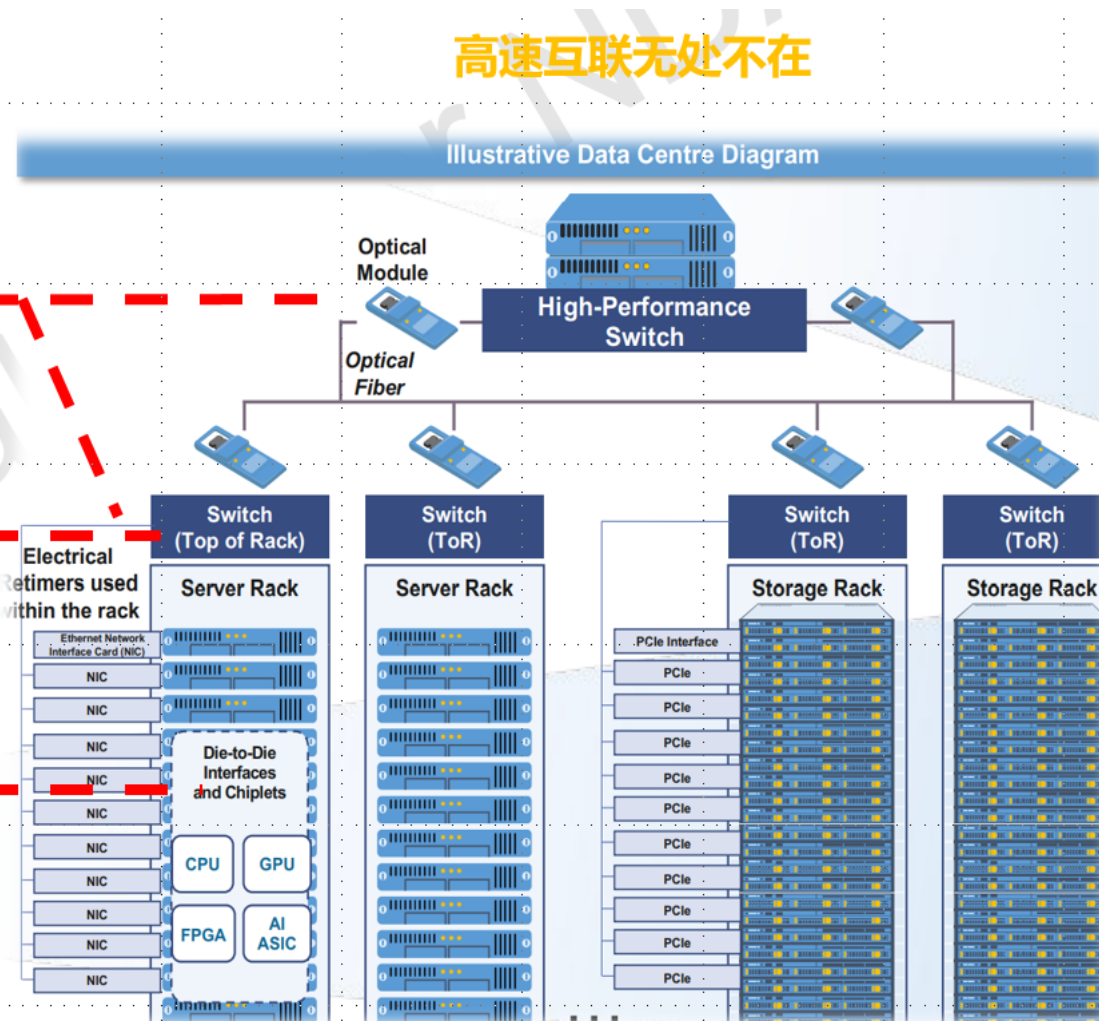
- 4*112G PAM4
- 8*112G PAM4

服务器内部芯片间互联

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Thank You