

基于英特尔第三代处理器的SPECVIRT优化

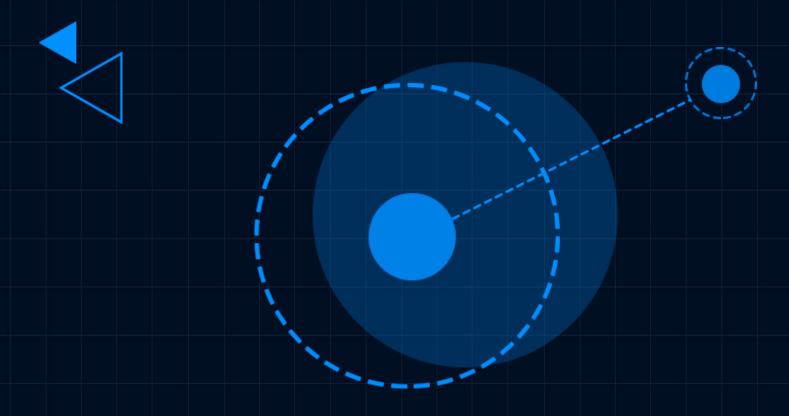


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第一章测试背景和英特尔相关技术

第二章 SPECvirt架构及安装

第三章 SPECvirt调优及实践



第一章



SPECvirt简介

Standard Performance Evaluation Corporation (SPEC标准性能评估机构) 是一个全球性的、权威的、代表目前业界标准的第三方应用性能测试组织

成立于1988年,由DELL、清华大学、微软等全球几十所知名大学、研究机构、IT企业组成,得到Intel、IBM、Inspur、 Huawei等支持和全球众多用户的广泛认可

推出众多性能测试: SPECvirt、SPEC Cloud、SPEC ML、SPEC CPU、SPECweb、SPECjAppServer、SPECmail等 SPECvirt综合使用SPECweb、SPECjAppServer、SPECmail、SPECPU四种基准测量工具,覆盖数据库、中间件、邮件服务、网站服务等多种业务类型;对服务器的CPU、内存、磁盘I/O、网络进行综合性能评测,是衡量虚拟化平台管理能力的一个标准方法



目标

世界第一 2路80核以内级别

挑战

之前结果一: 3376 更加透明的测试

结果

Inspur M6 Intel 8380: 4679 比之前结果一: 38.6%性能提升



SPECvirt 相关技术

Host pass through

Frequency Governor

超线程

大页

NUMA绑定

Renice

VCPU资源分配

INTEL ICX 8380

VROC

VMD

NVME NAND SSD

SRIOV

INTEL 82599 NIC

INTEL X-710 NIC



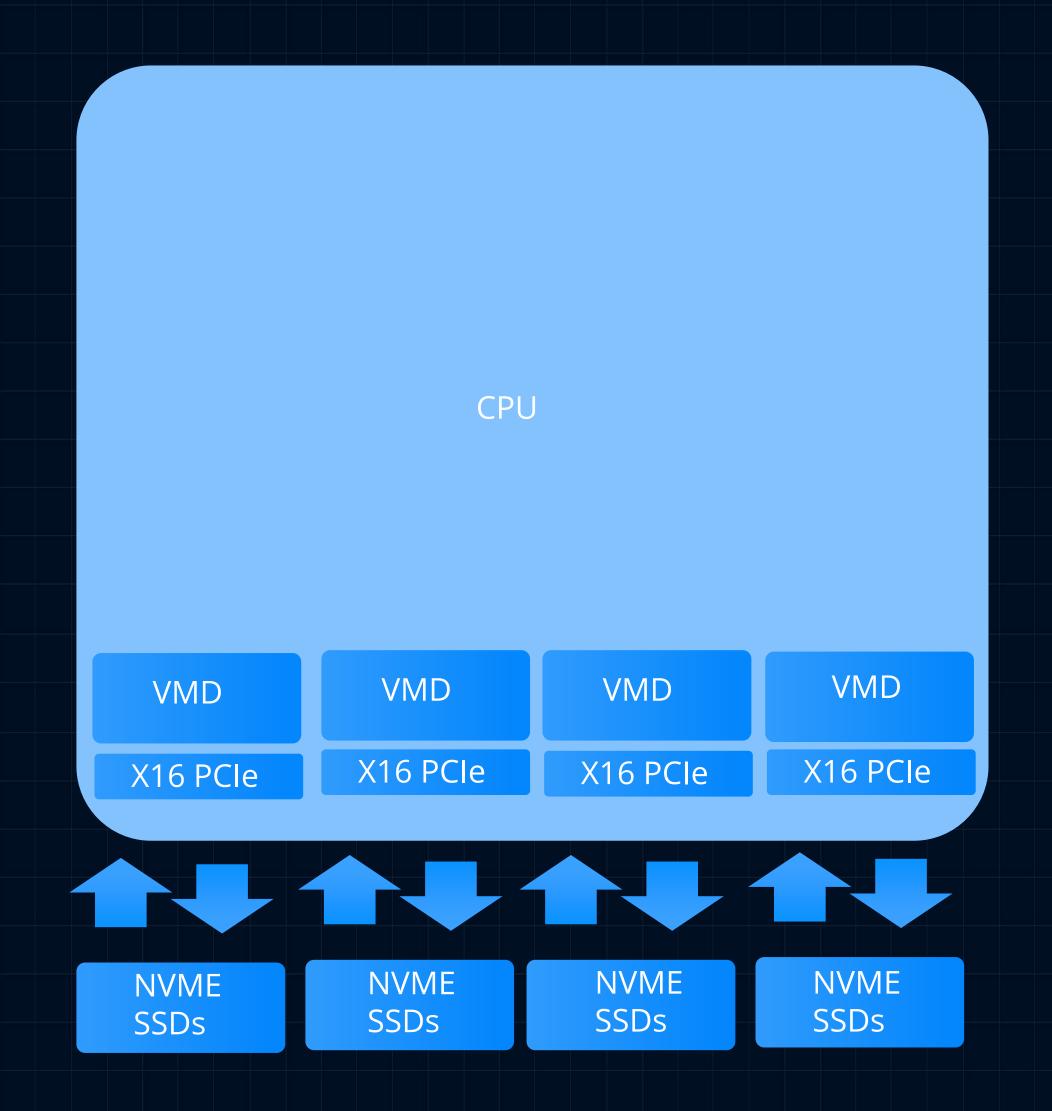
VMD

支持NVME, 不需要插卡

支持域: X16 root port

热插拔

LED管理





VROC

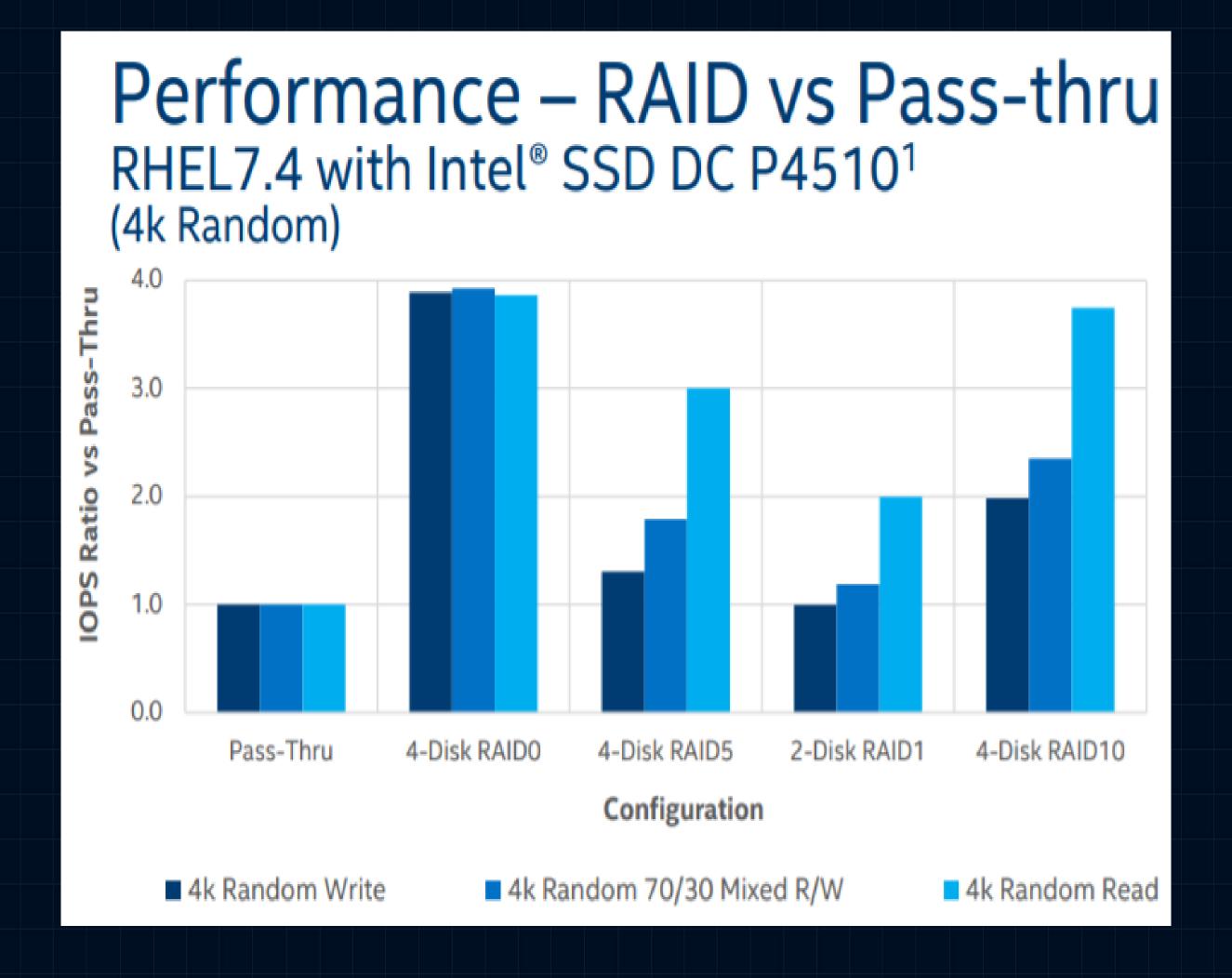
Hybrid RAID Solution

支持CPU直连NVME

LED管理

可引导的RAID

RAID 0/1/01/RAID5/SPAN





第二章



SPECvirt单Tile架构

融合四种标准测试

SPECweb2005

Web server

Infrastructure server

SPECjAppserver2004

Application server

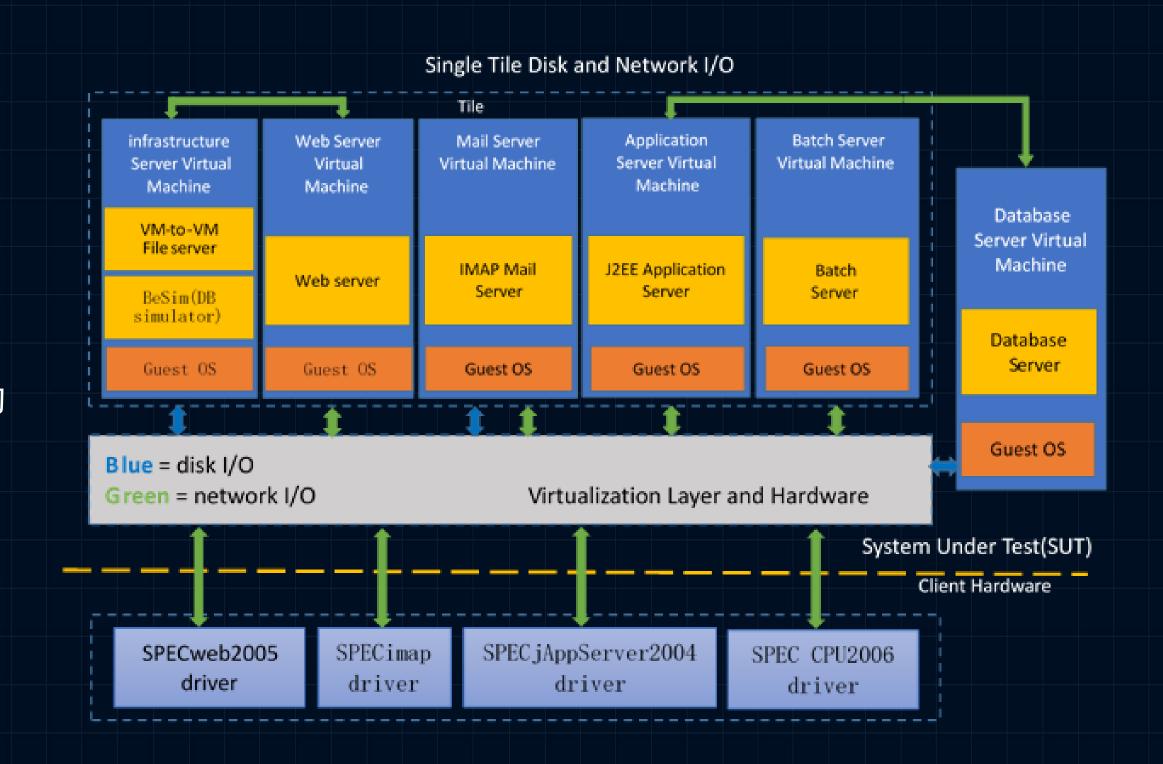
Database server(四个tile中的 Appserver共享)

SPECmail2008

Mail server

SPEC CPU2006

Batch server



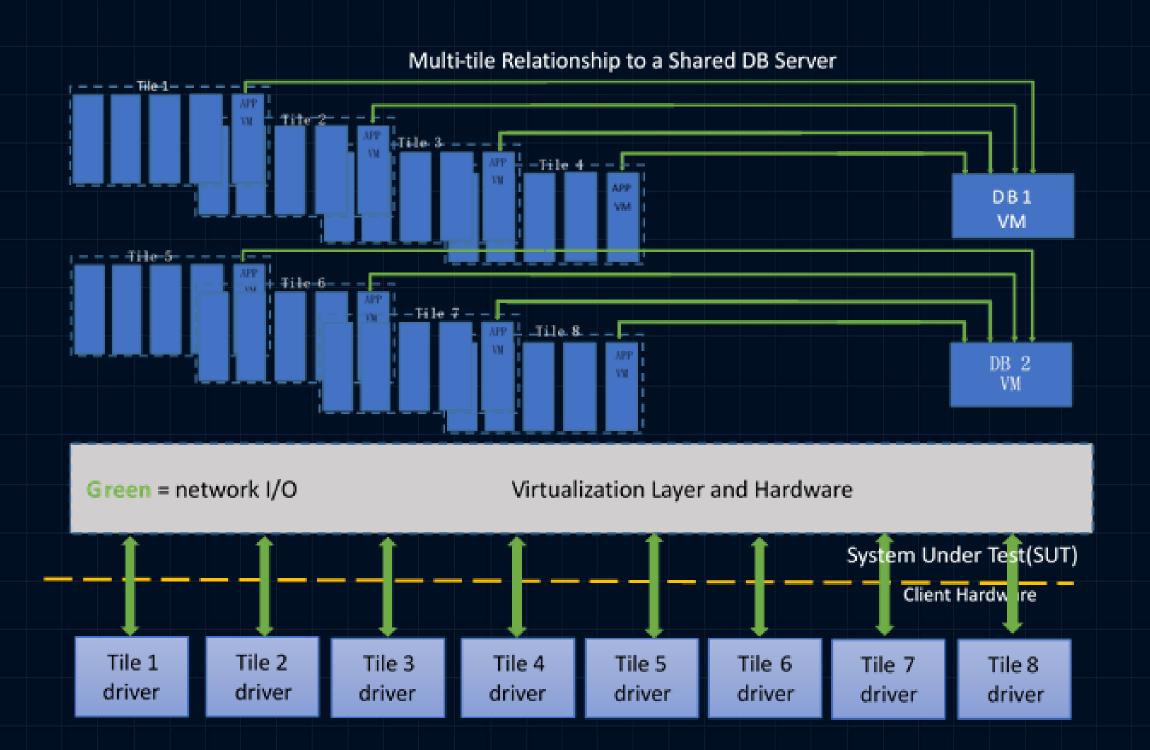


SPECvirt多Tile架构

Vms(50 tiles) = (50 Div 4) * 21 + (50 Mod 4)*5 + 1 = 12 * 21 + 2*5 + 1 = 252 + 11 = 263

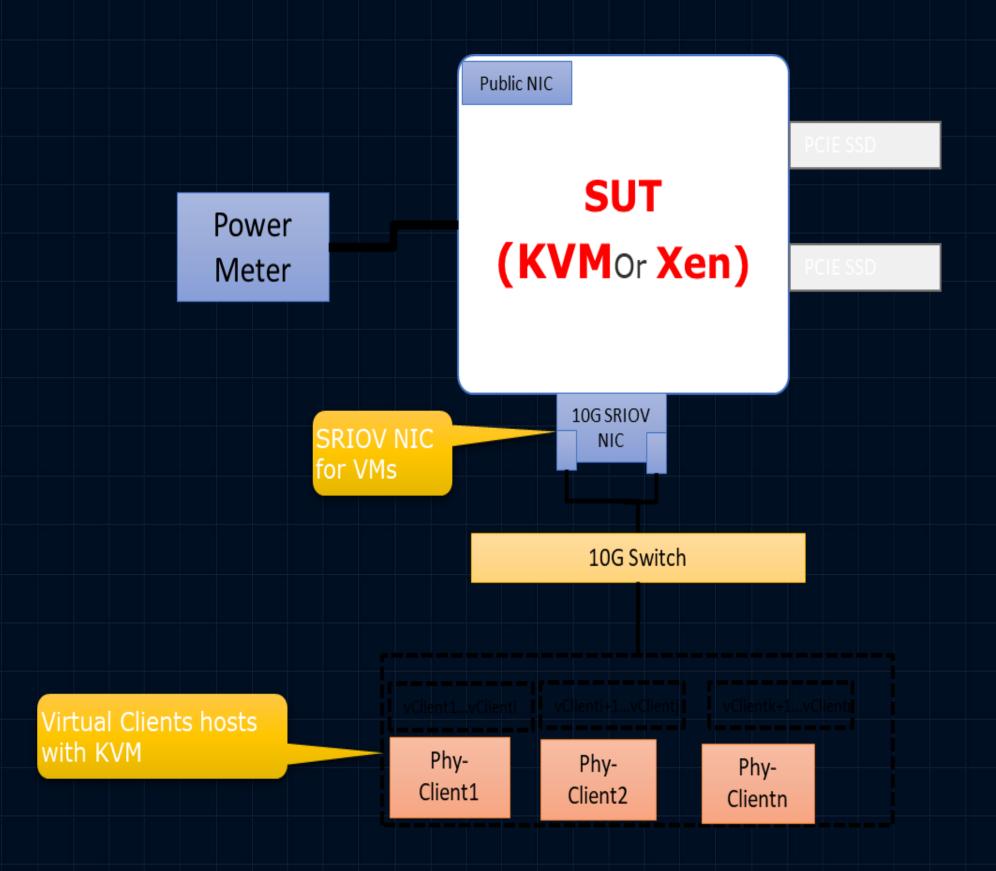
vCPUs = (50 Div 4) *(4*9 + 3) + (50 Mod 4) * 9 + 3 = 12*39 + 2*9 + 3 = 468 + 18 + 3 = 489

vCPUs/pCPUs = 489/160 = 3.05625 : 1





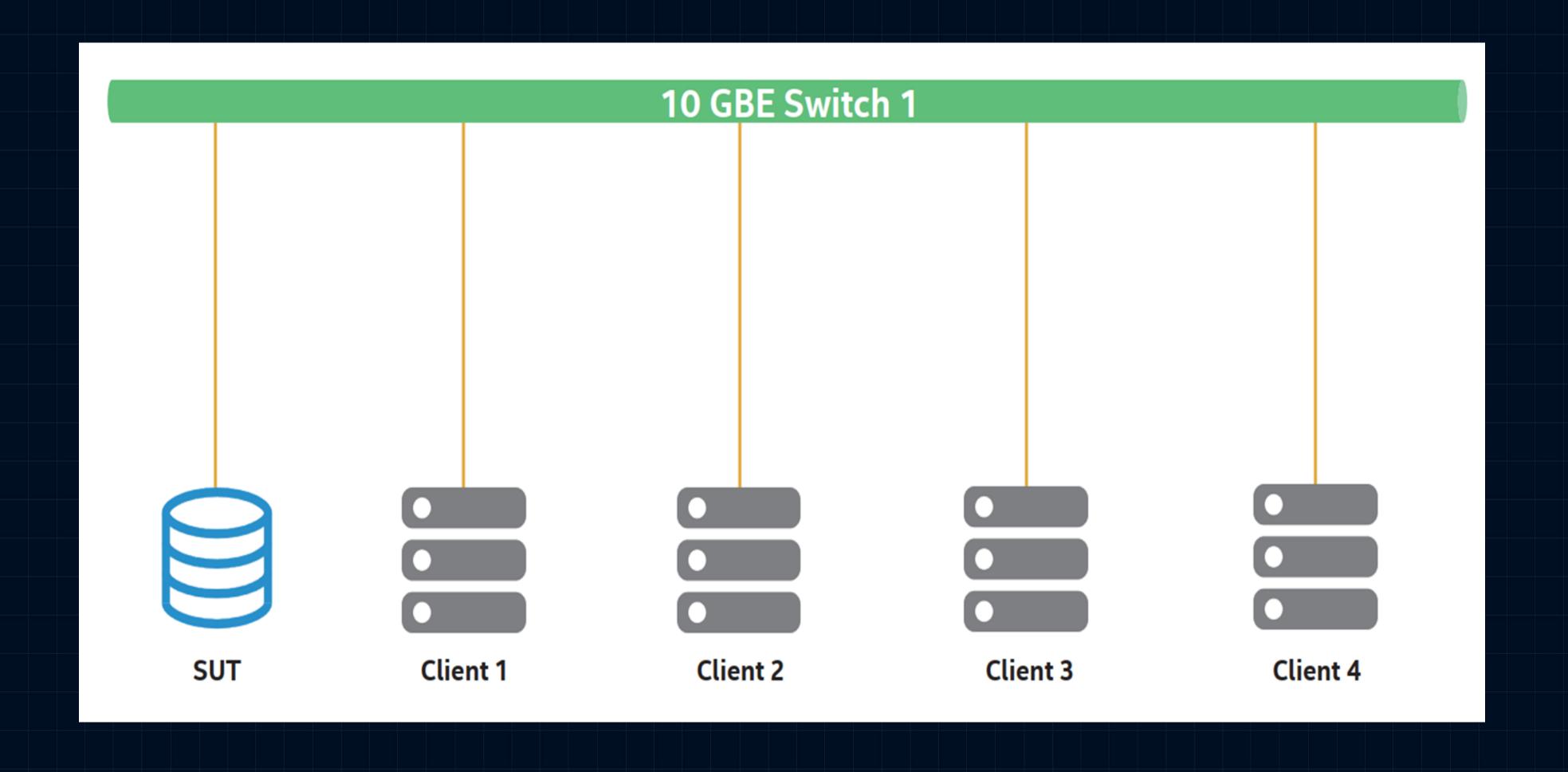
典型系统配置



Virtual clients, 10G switch and SRIOV NIC



SPECvirt环境搭建





SPECvirt 安装





第三章



SPECvirt调优及实践

在NF5280M6服务器上使用Xeon Platinum 8380CPU跑50个tile得分4679

https://www.spec.org/virt_sc2013/results/res2021q3/virt_sc2013-20210804-00127-perf.html

SPECvirt_sc2013 Result

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Inspur Corporation: NF5280M6 Inspur: InCloud Sphere 6.0.0

SPECvirt_sc2013 4679 @ 263 VMs

Tested By: Inspur

SPEC License #: 3358

Test Date: Aug-2021

Performance Section
Performance Summary
Performance Details
Validation Errors

SUT Configuration Section

Physical Configuration

Virtual Configuration

N/A

Power Section

Notes Section
Physical System Notes
Virtualization SW Notes
Hosted VM Notes



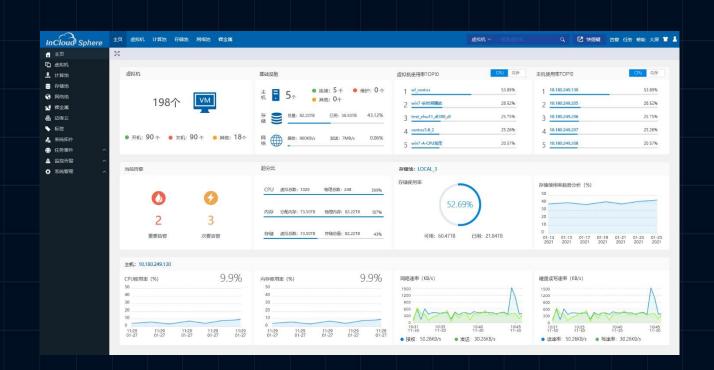
SUT配置

软件平台

浪潮云海服务器虚拟化系统 InCloud Sphere

2011年发布第一个版本

IDC数据:全球SDC市占率Top 5



硬件平台

浪潮双路机架式服务器 NF5280M6

Xeon® Platinum 8380

4 x 3.2TB NVMe SSD, 1 x 2.0TB NVMe SSD





VROC配置





VROC配置

重启生效

```
Aptio Setup - AMI
                                         Socket Configuration
VMD Config for PCH ports
                                                  ▲ Enable/Disable VMD in
Enable/Disable VMD
                         [Enabled]
                                                   this Stack.
PCH Root Port 0
                         [Disabled]
Hot Plug Capable
                         [Enabled]
OfgBar size
OfgBar attribute
                         [64-bit prefetchable]
MemBar1 size
                         25
MemBar1 attribute
                         [32-bit
                         non-prefetchable]
                         20
MemBar2 size
                         [64-bit
                                                   →+: Select Screen
MemBar2 attribute
                                                   ↑↓: Select Item
                         non-prefetchable]
                                                   Enter: Select
                                                   +/-: Change Opt.
VMD Config for IOU 0
                                                   F1: General Help
                         [Disabled]
                                                   F2: Previous Values
Enable/Disable VMD
                                                   F9: Optimized Defaults
                                                  ▼ F10: Save & Exit
                                                   ESC: Exit
                 Version 2.21.1279 Copyright (C) 2021 AMI
                                                                          AB
```



创建RAID

Aptio Setup — AMI Main <mark>Advanced</mark> Platform Configuration Socket Configuration Server Mgmt ♪	
Hazir Havaneca Fractoriii Bolli zgal actorii Bookec Bo	THE TENT OF THE TENT OF
▶ Intel(R) 82599 10 Gigabit Dual Port Network ▲	This formset allows the
Connection – B4:	user to manage Intel(R)
▶ VLAN Configuration (MAC:B4	Virtual RAID on CPU
► MAC:B4(
► MAC:B4IPv4 Network Configuration	
▶ Intel(R) Ethernet Server Adapter X520–2 –	
F8:	
► VLAN Configuration (MAC:F8	
► MAC:F8IPv6 Network Configuration	
► MAC:F8 –IPv4 Network Configuration	
▶ Intel(R) Ethernet Server Adapter X520–2 –	→+: Select Screen
F8:	↑↓ : Select Item
▶ VLAN Configuration (MAC:F8)	Enter: Select
► MAC:F8 ——IPv6 Network Configuration	+/-: Change Opt.
► MAC:F8 ——IPv4 Network Configuration	F1: General Help
▶ Intel(R) Virtual RAID on CPU	F2: Previous Values
	F9: Optimized Defaults
▶ Driver Health ▼	F10: Save & Exit
	ESC: Exit
Version 2.21.1279 Copyright (C) 2021 AMI	
	AB

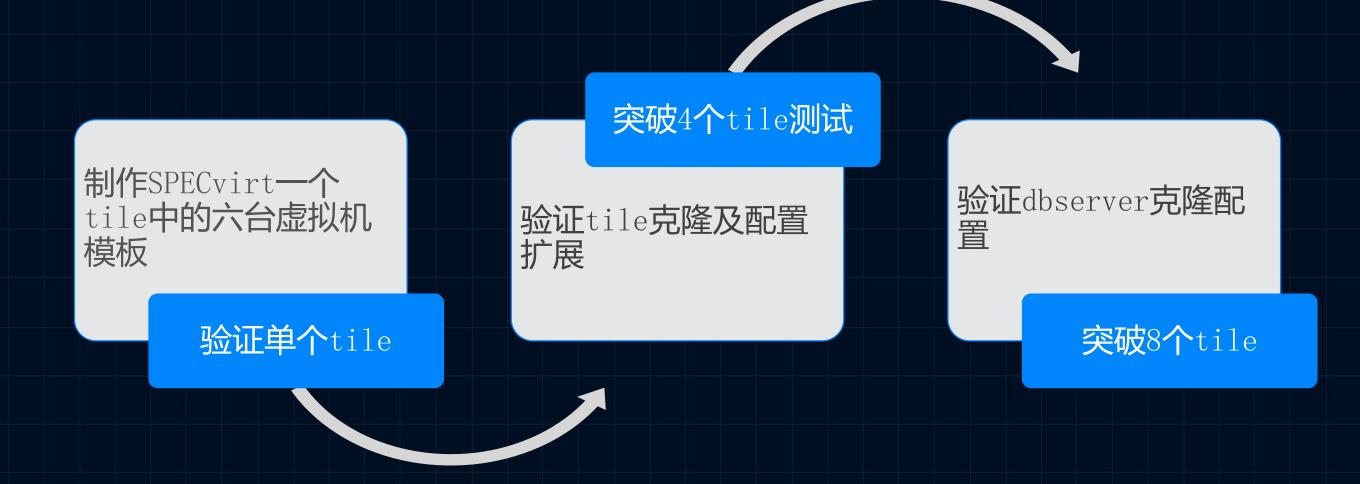


创建RAID





验证模板配置





SUT调优

开启CPU超线程 64GB内存要满配 服务器网卡配置要均衡 虚拟机内部服务保持一致 虚拟机CPU设置为Host passthrough模式



SPECvirt调优

