

领先的高性能计算和人工智能

Scott Tease

融合计算
2019 联想全球超算峰会
Lenovo HPC Summit



Lenovo

是...

- 在高性能计算机领域（HPC）处于行业领先地位
- 通过端到端客户参与和深度合作推动人工智能技术使用
- 在全球范围内帮助解决人类面临的
最大挑战

#1 全球超级计算机供应商

深度垂直的技术能力+伙伴关系

全球多元化+分享

Lenovo Neptune = 水冷系统

HPC 驱动 AI = AI 为所有

三分之一
TOP500 系统
信任联想



联想:改变生命研究的可靠引擎

Lenovo 联想



UNIVERSITY OF TORONTO



前25所研究型大学中有17所
运行联想HPC解决方案

We Enable Amazing
Every Day!

<https://www.timeshighereducation.com/world-university-rankings/2018>

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哈佛大学

800

ThinkSystem

SD650 节点

1st

联想液冷
北美超级计算中心



45%

更低能耗

比传统风冷系统

更高性能

(Petaflops)

通过水冷技术提高
CPU处理性能

1,000,000,000,000,000,000,000,000,000,000,000

每秒10的18次方科学计算 = 1个 exaflop

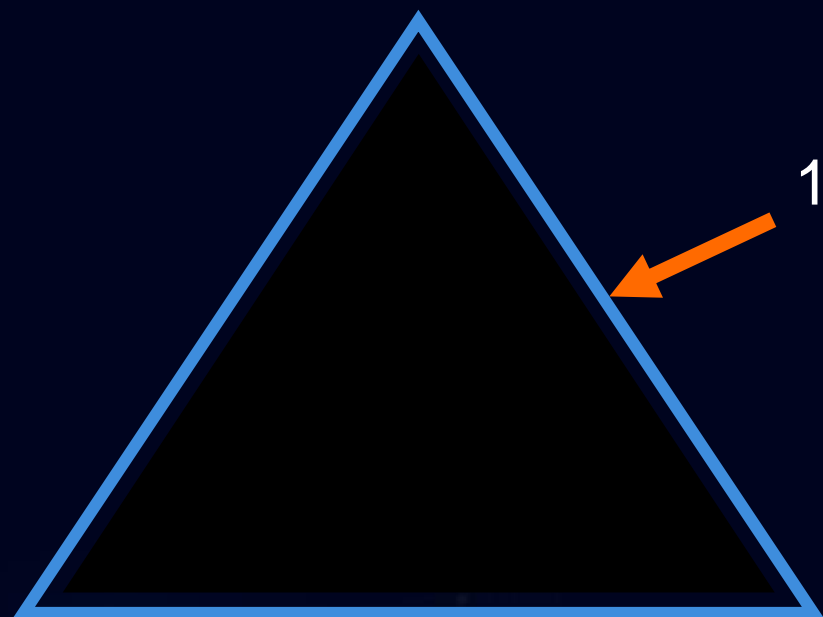
ExaScale

达到E级计算是一个挑战

但是....重要的是如何利用IT设计来实现这个目标

Exascale: 2种方式

仅为Exascale设计

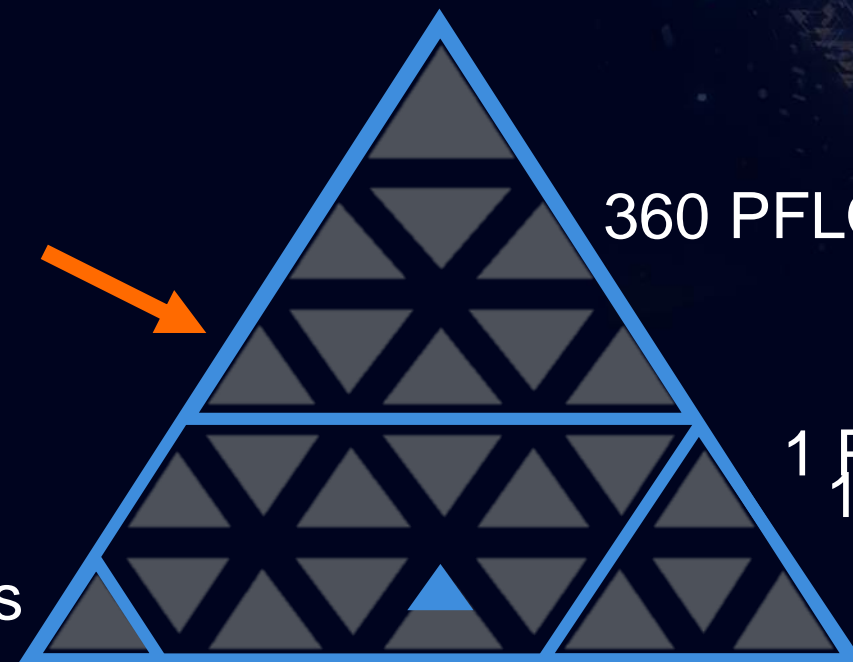


< 5-6 全球
成本: \$10亿美金
专用的设计

- 独特的机柜
- 专有的高速网络
- 独有的供电

为Every scale设计Exascale

1,000 petaflops
1 exaflop



360 PFLOPs

1 PFLOPs
160 PFLOPs

40 PFLOPs

1000s 全球
灵活的预算
开放的设计

- 标准19英寸机柜
- 开放的高速网络
- 标准的供电

ExaScale

与HPC领导者
合作设计

社区及合作关系

扩展的生态圈

水冷系统

存储

高密度

智能互联

可扩展软件

加速器

EveryScale 在行动!

共享I/O

- 2018 –与Mellanox公司合作交付 EDR 共享I/O
- 今天 HDR的共享 I/O 为每个服务器提供 100GB
 - 1/2 插卡
 - 1/2 线缆
 - 1/2 交换机
- 更少的部件= 更少的成本 + 更少的功耗+ 更少的复杂性.



水冷系统

- 2012 – SuperMUC 第1套系统安装 - 在Top500中排名第四
- 今天 水冷系统遍及世界各地



SciNet

多伦多大学

1,500
ThinkSystem

SD530节点

#1

加拿大超级计算中心

世界No.1

部署Dragonfly Infiniband
高速网络

The
GREEN
500

#31 Energy Efficient
Supercomputer

TOP 500
The List.

#69 supercomputer
on the Top500

领先 创新 技术

第一个温水水冷系统
全球HPC解决方案



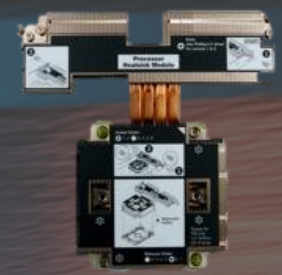
NeptuneTM

液体冷却技术



智能控制软件

- 动态调节CPU 浮点计算
- 最大限度减少能源消耗



热转换模块

- 比风冷系统提升24%处理能力
- 每个机架每年节省\$2,100



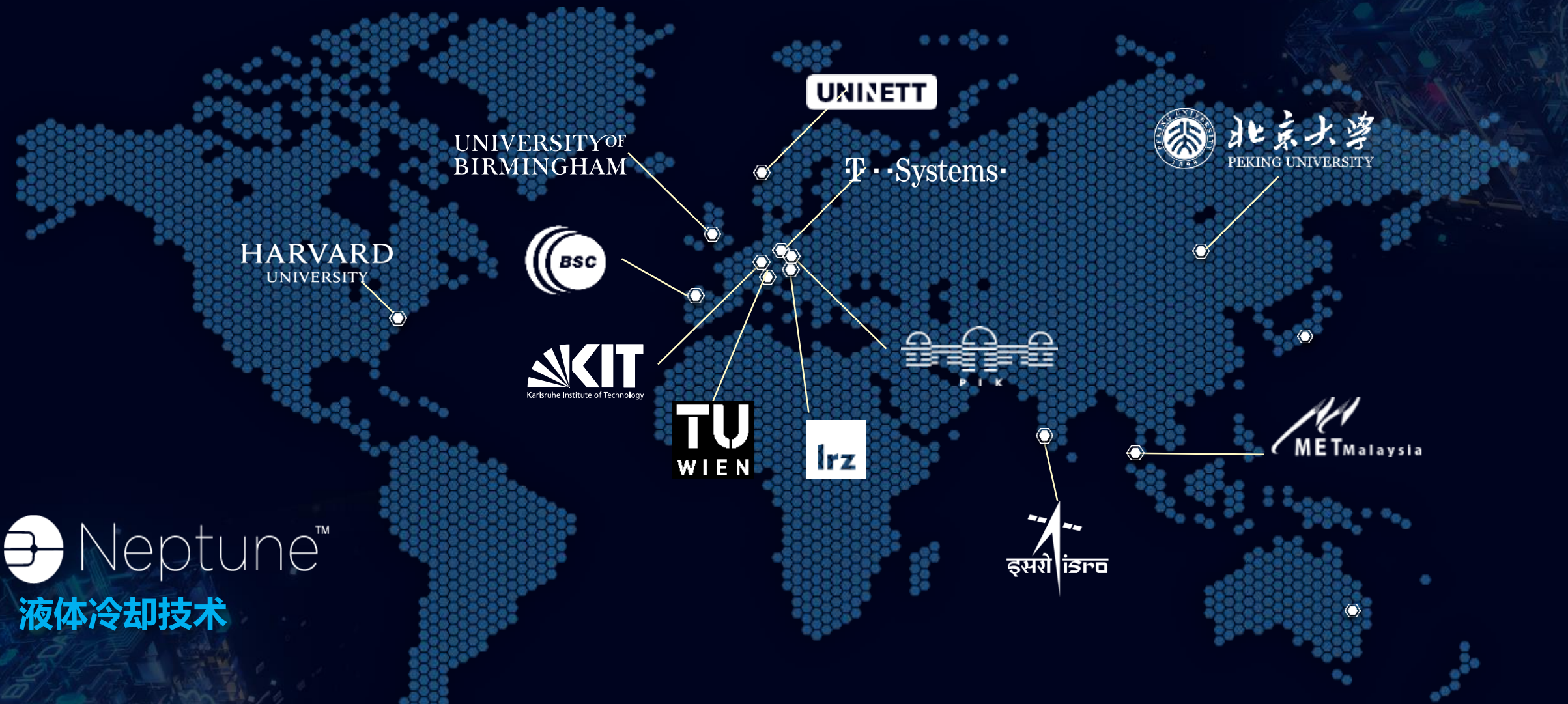
水冷机柜后门

- 比风冷提高3.5倍的效能
- 节省的效能可提供4000个LED灯的电力



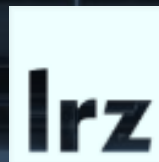
水冷节点

- 比风冷系统提升45%处理能力
- 降低 40% 电力成本



Neptune™
液体冷却技术

莱布尼兹超级计算中心



Leibniz-Rechenzentrum
der Bayerischen Akademie der Wissenschaften

Lenovo 联想



使用强大的联想
Neptune 技术

能耗节省

5,000个
家庭使用

45%

降低能耗

与风冷系统相比



#8 supercomputer
on the Top500

19.5 PF

(Petaflops)理论
计算能力
26.9 PF

新增6500

液冷节点

2万+ 从2010年

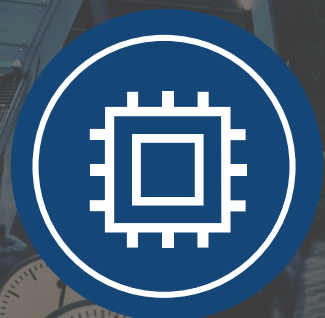
全球最大规模

通用产品
超级计算中心

90 Racks | 6,480 Nodes | 311,040 Cores

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共同的元素



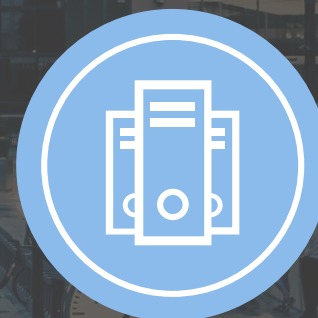
加速器
(GPUs, FPGAs)



高速网络



顶级的 CPUs



高速存储



开源软件

LAUNCH: AI
Transforming Your Business With Artificial Intelligence

64%
of respondents believe AI will be a top priority for their organization in 2019.

What We'll Cover

- AI in Business: The Business Case
- AI in the Cloud: The New Frontier
- AI in the Edge: The New Frontier
- AI in the Data Center: The New Frontier
- AI in the Network: The New Frontier
- AI in the Security: The New Frontier
- AI in the Supply Chain: The New Frontier
- AI in the Marketing: The New Frontier
- AI in the Customer Service: The New Frontier
- AI in the HR: The New Frontier
- AI in the Finance: The New Frontier
- AI in the Legal: The New Frontier
- AI in the Compliance: The New Frontier
- AI in the Risk Management: The New Frontier
- AI in the Operations: The New Frontier
- AI in the Manufacturing: The New Frontier
- AI in the Retail: The New Frontier
- AI in the Healthcare: The New Frontier
- AI in the Education: The New Frontier
- AI in the Government: The New Frontier
- AI in the Non-Profit: The New Frontier
- AI in the Media: The New Frontier
- AI in the Entertainment: The New Frontier
- AI in the Sports: The New Frontier
- AI in the Travel: The New Frontier
- AI in the Hospitality: The New Frontier
- AI in the Real Estate: The New Frontier
- AI in the Insurance: The New Frontier
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- AI in the Real Estate: The New Frontier
- AI in the Insurance: The New Frontier
- AI in the Banking: The New Frontier

Industry Specific Solutions
Gain up to 10x ROI in your industry.

Free
- Free AI in Business: The Business Case
- Free AI in the Cloud: The New Frontier
- Free AI in the Edge: The New Frontier
- Free AI in the Data Center: The New Frontier
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QR Code

Lenovo Data Center Group

STUTT GART

MORRISVILLE

BEIJING

TAIPEI

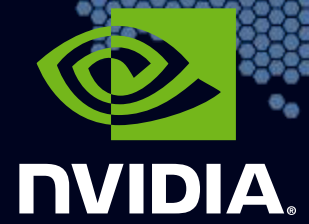
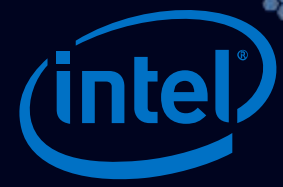
人工智能创新中心

Lenovo

ARTIFICIAL INTELLIGENCE INNOVATION CENTERS



ThinkSystem



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联想 HPC & AI 的新变化

Lenovo 联想



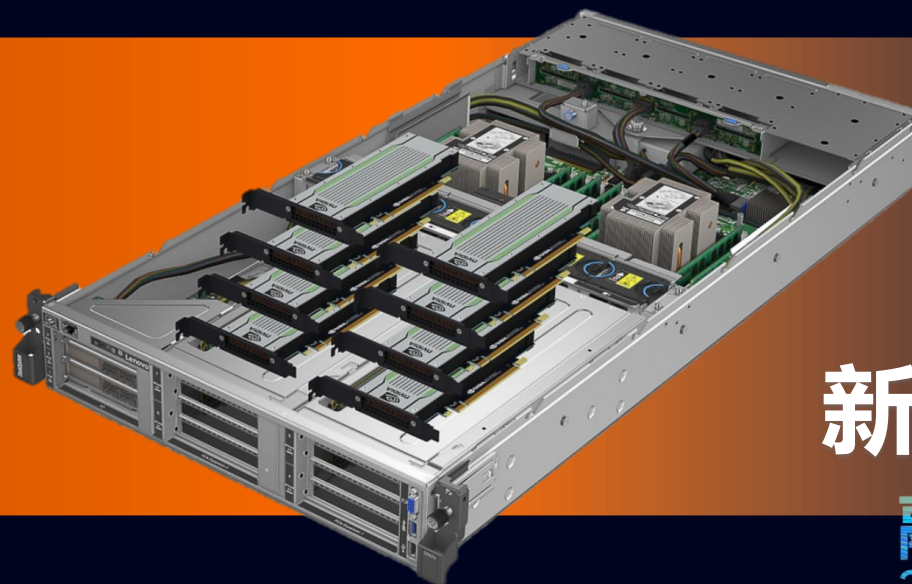
硬件 – 联想 ThinkSystem SR670

Lenovo 联想



- 为HPC/AI 设计
- 支持4个GPU模块
- 优化:
 - ✓ AI - ML/DL + VDI 工作负载
 - ✓ 所有类型的HPC工作负载

- 最新 NVIDIA Tesla T4
- 8 个GPU 系统
- 优化
 - ✓ AI 性价比
 - ✓ Inference 推理
 - ✓ 虚拟化 (VDI)



新!

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联想智能超算统一平台(LiCO)

Lenovo 联想



可扩展, 开放, 支持 AI 解决方案

最新版本! LiCO 5.3

- 联想Accelerated AI Studio
- 支持SR950 - 更大内存容量
- DevOps 集成
- 为Intel CPUs提供最新 MxNet 调优技术

LiCO帮助用户管理他们的AI系统作为一个共享资源和可伸缩的AI



荣获最佳AI软件奖

Lenovo Accelerated AI Studio

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Thanks