Accelerating I/O-Intensive Applications in IT Infrastructure with Innodisk FlexiArray™ Flash Appliance

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Outline

- Innodisk Introduction
- Industry Trend & Challenge
- Innodisk FlexiRemap™ Technology
- Innodisk FlexiArray™ Product
- Calls to Action

Innodisk Overview

- About Innodisk Corporation
  - Founded in 2005 in Taiwan
  - Got Initial Public Offerings in 2013
  - Employees (Global): 400, Headquartered in Taipei
  - Leader in industrial memory and storage products
  - Capabilities and experiences in firmware & software development for flash memory management
  - Dedication to providing **absolute service**

Innodisk Complete Solutions

Different Form Factor Flash Products

Flash

DRAM

Wide Temp., Coating

Product Category [CUSTOMIZED]

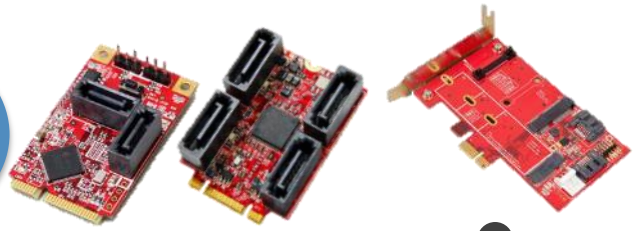
Cloud Storage

All Flash Array

Industrial Graphic Card GPU board

AETINA (Subsidiary)

Embedded Peripheral

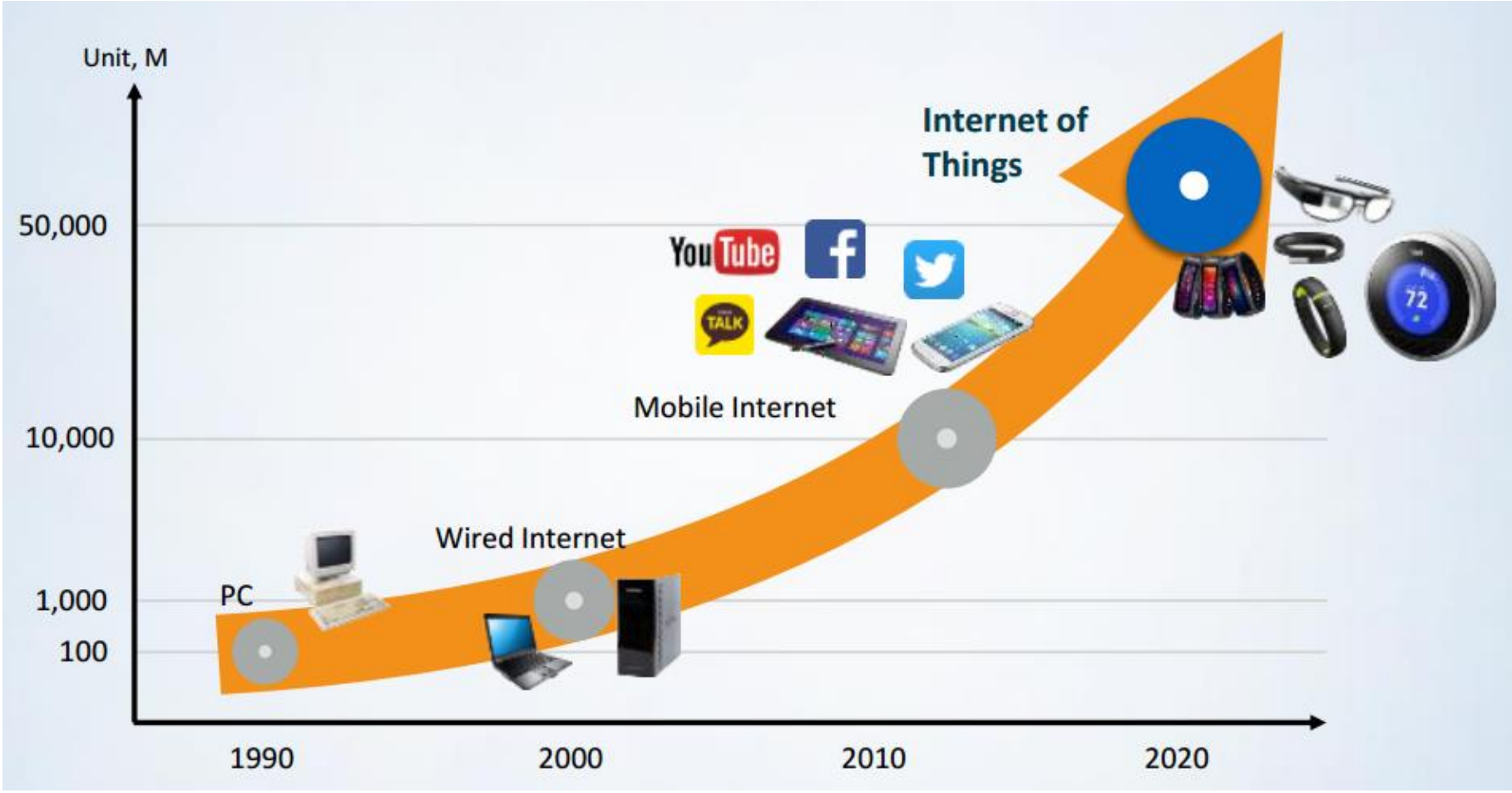


Adapter

innodisk

INDUSTRY TREND AND CHALLENGE

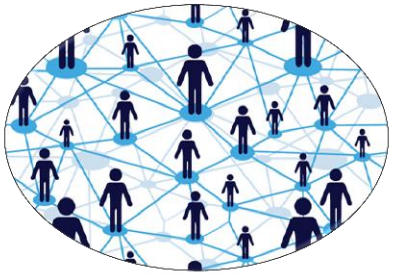
IT Growth Trend: PC → Mobile → IOT



Source: KPCB, Cisco

Mobile Data Traffic Growth

Faster Speed



More Users

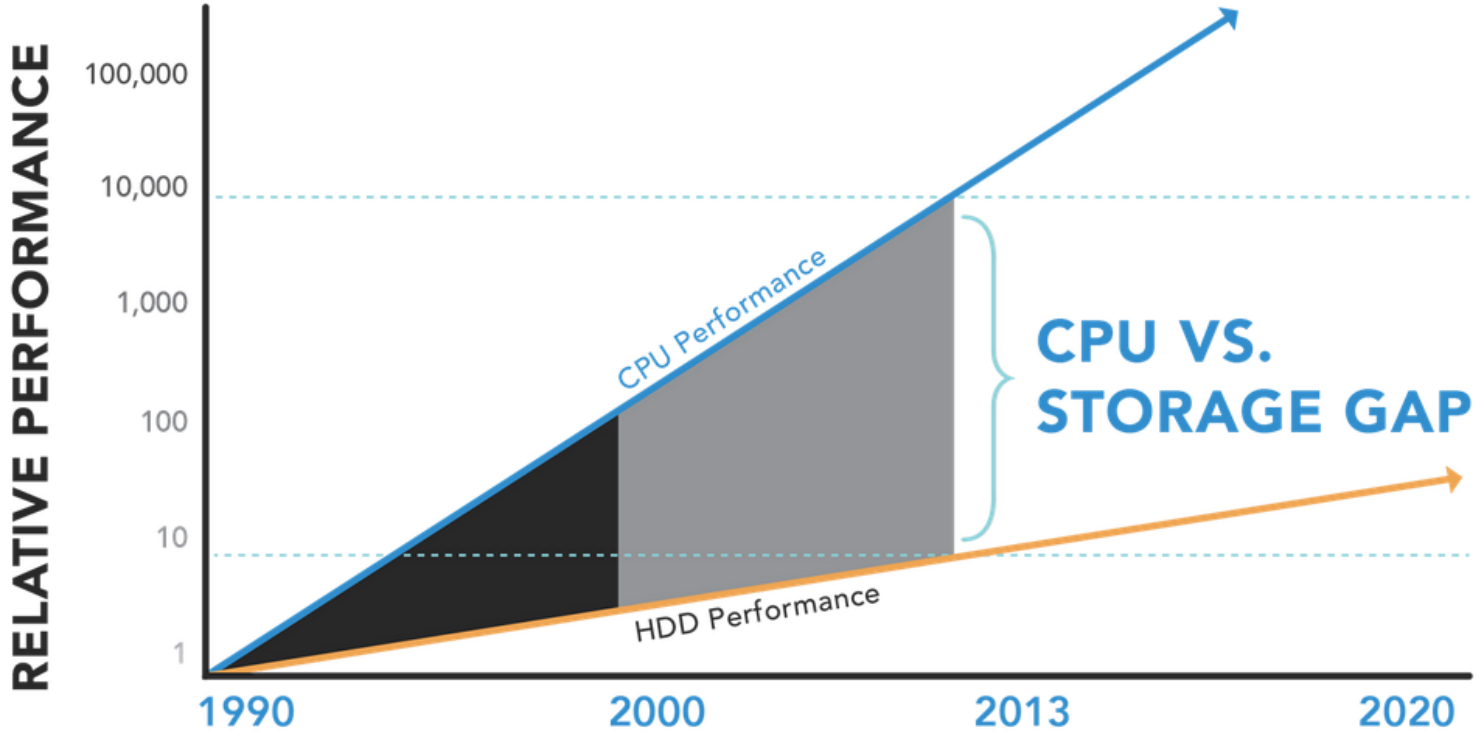
More Videos

More Connections

Global Mobile Data Traffic Forecast, 2013–2018

The Performance Gap Challenge

- By Moore's law, CPU improves 100 times every decade, while drive performance remains flat
- Applications will increasing suffer unless moving to flash



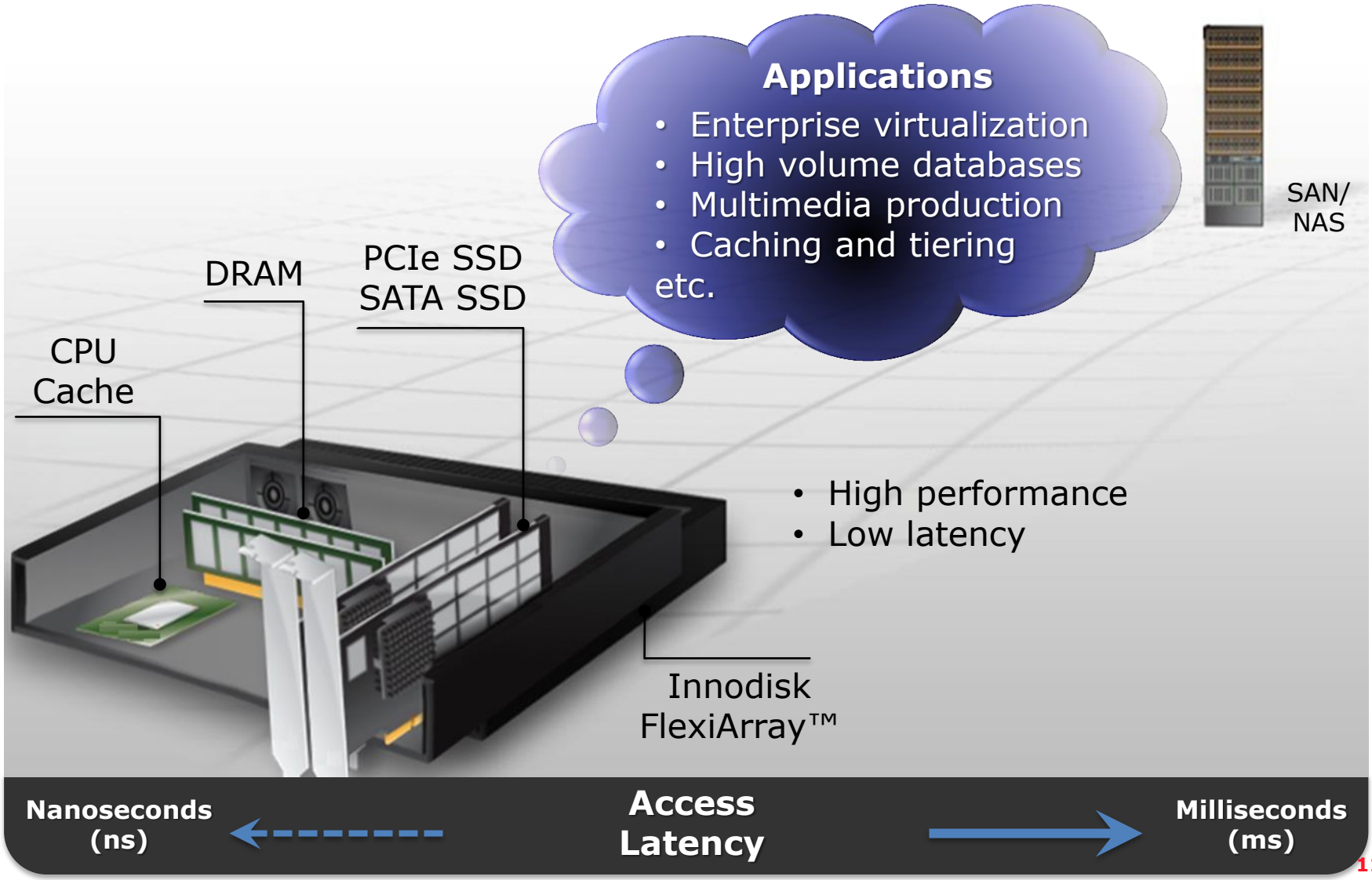
The Challenges

- Performance of Storage Access
  - Performance hit for **random write** operations
  - Performance varies quite a bit along with time and space of use
- Data Endurance and Protection
  - Relatively **limited** lifespan of flash cells
  - Data loss upon drive failure
- Cost Effectiveness
  - Solutions based on specialized hardware designs are **not affordable** to a wide variety of market segments with such demands

Our Solution – FlexiRemap Technology

- About Innodisk **FlexiRemap™** Technology
  - Manages flash memory with software running in kernel level of OS
  - Aggregates multiple SSDs into a super drive to deliver high IOPS even for random writes
  - Incorporates a collaborative architecture for drivers and firmware to work together
  - Runs on standard commodity off-the-shelf (COTS) platforms, without need for special hardware

Storage for Cloud Computing



Different Ways to Build Flash Array

High performance through direct control over flash memory

Approach I
Design from scratch and build flash array with proprietary hardware and software components
– tends to be expensive

Approach II
Leverage standard server platforms and create custom software to accommodate SSD behaviors
– hits limitations imposed by SSDs

Approach III: Innodisk FlexiRemap™
Innovations in software and firmware, running on commodity off-the-shelf (COTS) platforms

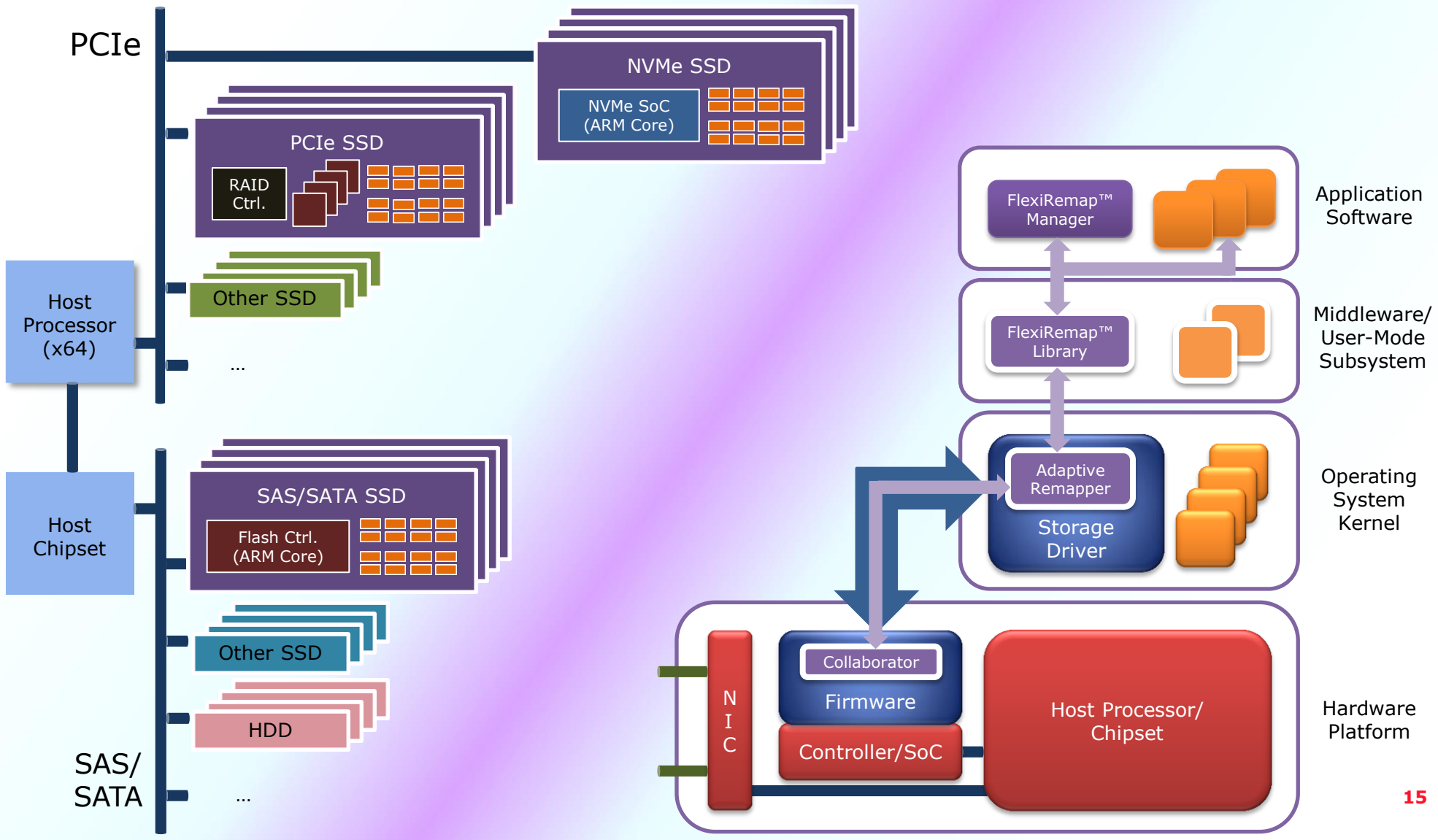
Cost-effective, more affordable

OUR SOLUTION: INNODISK FLEXIREMAP™ TECHNOLOGY

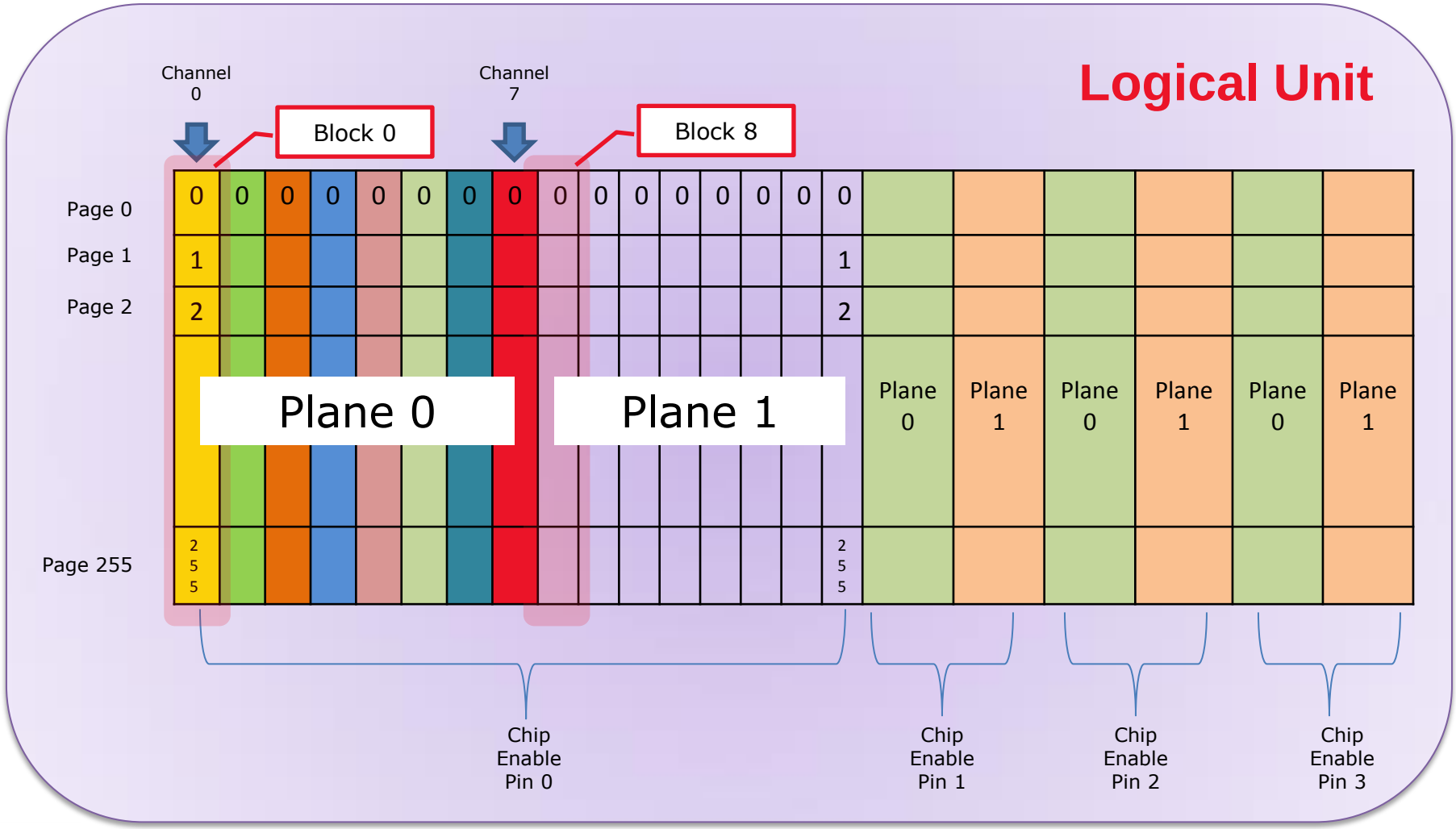
Innodisk FlexiRemap™ Technology

- Innodisk FlexiRemap™ Technology Features:
  - An adaptive FTL implemented at OS **kernel** level
  - Flexible aggregation of multiple SSDs into a **super drive**
  - Smart rescheduling of random write operations into **sequential** ones
  - Global wear leveling with **inter-drive** knowledge

System Architecture

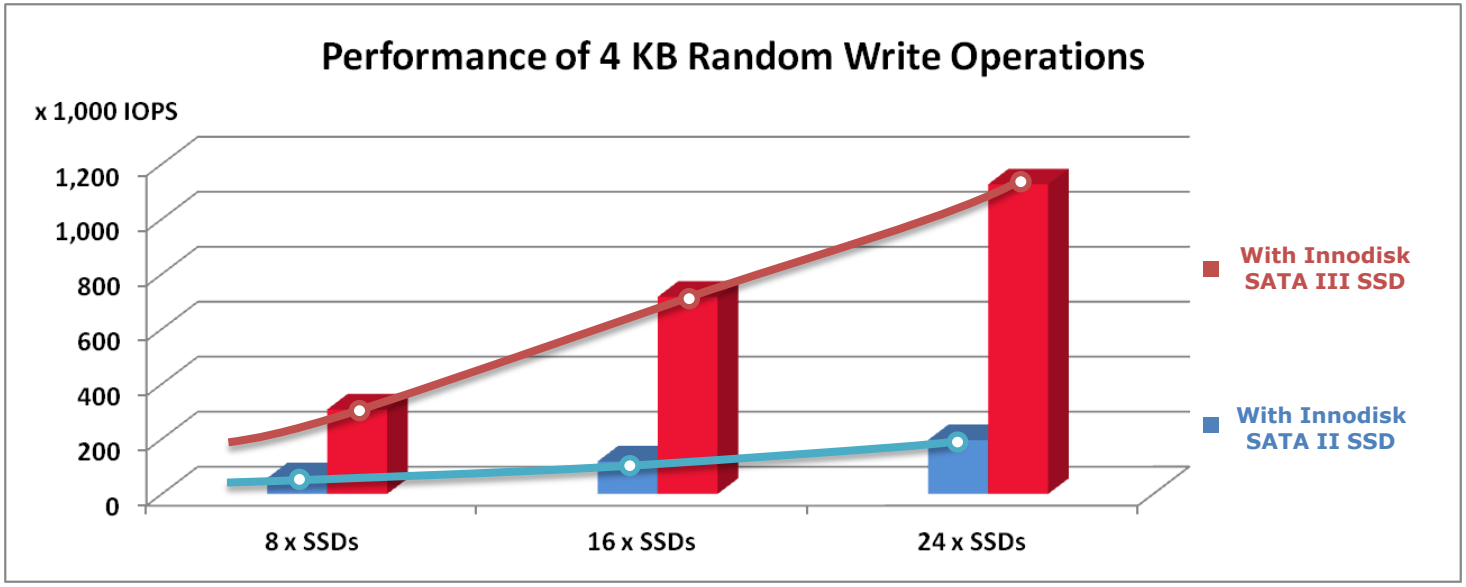


Direct Control over Flash Memory



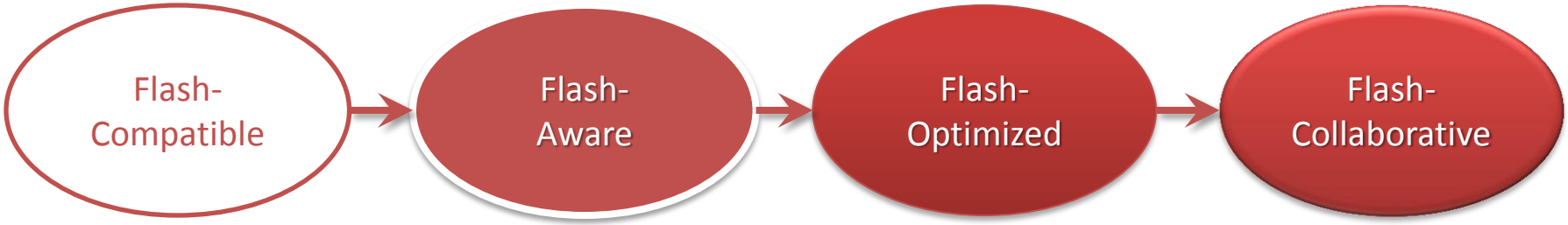
Scalable Performance

- Projected IOPS with Innodisk SATA III SSDs
  - 8 x SSDs: 280K+ IOPS for random write
  - 16 x SSDs: 650K+ IOPS for random write
  - 24 x SSDs: **1M+ IOPS** for random write



Differentiation

- Highest Possible Performance under Same Architecture
  - From **flash-compatible** to **flash-collaborative**
  - Achieving sustained high IOPS through close collaboration between upper-layer **software** and underlying **firmware**
  - Built upon commodity off-the-shelf (COTS) platforms and components, without need for custom-made, expensive hardware



Productization Possibilities

- Products Powered by FlexiRemap™ Technology
  - High-performance storage appliance
    - Flexible disk array, with sustained high IOPS
    - Expandable, up to 24 x 2.5" SSDs

  - Acceleration board for I/O-bound applications
    - No change to existing applications
    - Plug and play, intuitive configuration

  - Performance optimization software suite
    - Boosting performance of SSDs
    - Transparent to application software

FlexiArray™ Storage Appliance

	FlexiArray™ SE108	FlexiArray™ SE110
Configuration	1 TB	3 TB
Performance (4 KB Random Write)	**Sustained 285,000 IOPS**	**Sustained 320,000 IOPS**
Flash Type	MLC	MLC
Connectivity	4 x 10GbE SFP+ or 1 x InfiniBand FDR QSFP	4 x 10GbE SFP+ or 1 x InfiniBand FDR QSFP
Protocols Supported	iSCSI, NFS, CIFS	iSCSI, NFS, CIFS
Form Factor	1U Rack Mount	1U Rack Mount
Power	Max. 750 W	Max. 750 W

FlexiArray™ SE110

FlexiArray™ SE108

Calls to Action

- Go to http://flexiarray.innodisk.com/ for additional information

- Send your inquiries to cloudsolution@innodisk.com

THANK YOU

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Innodisk Corporation | 宜鼎國際股份有限公司

設計 Design | 服務 Service | 品質 Quality | 交期 Delivery