Building a High IOPS Flash Array: Challenges and Our Solution

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Outline

- Quick Introduction
- Defining the Problem
- Our Solution:
  Innodisk FlexiRemap™ Technology
- Calls to Action

QUICK INTRODUCTION

Quick Introduction 1/2

- About Innodisk Corporation
  - Founded in 2005
  - Leader in industrial memory and storage products
  - Capabilities and experiences in firmware & software development for flash memory management
  - Dedication to providing Absolute Service™

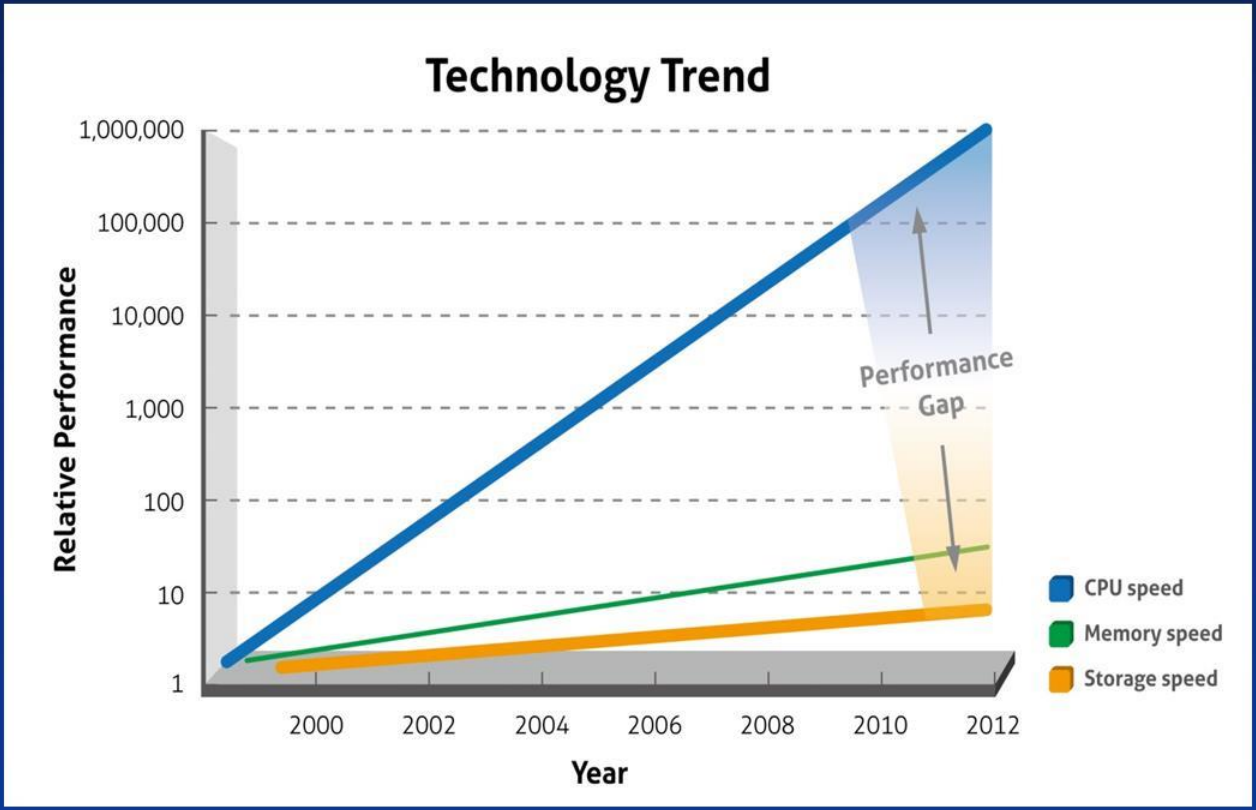
Quick Introduction 2/2

- About Innodisk FlexiRemap™ Technology
  - Manages flash memory with software running in kernel level of OS
  - Aggregates multiple SSDs into a super drive to deliver 1M+ IOPS even for random writes
  - Incorporates a collaborative architecture for drivers and firmware to work together
  - Runs on standard COTS platforms, without need for special hardware

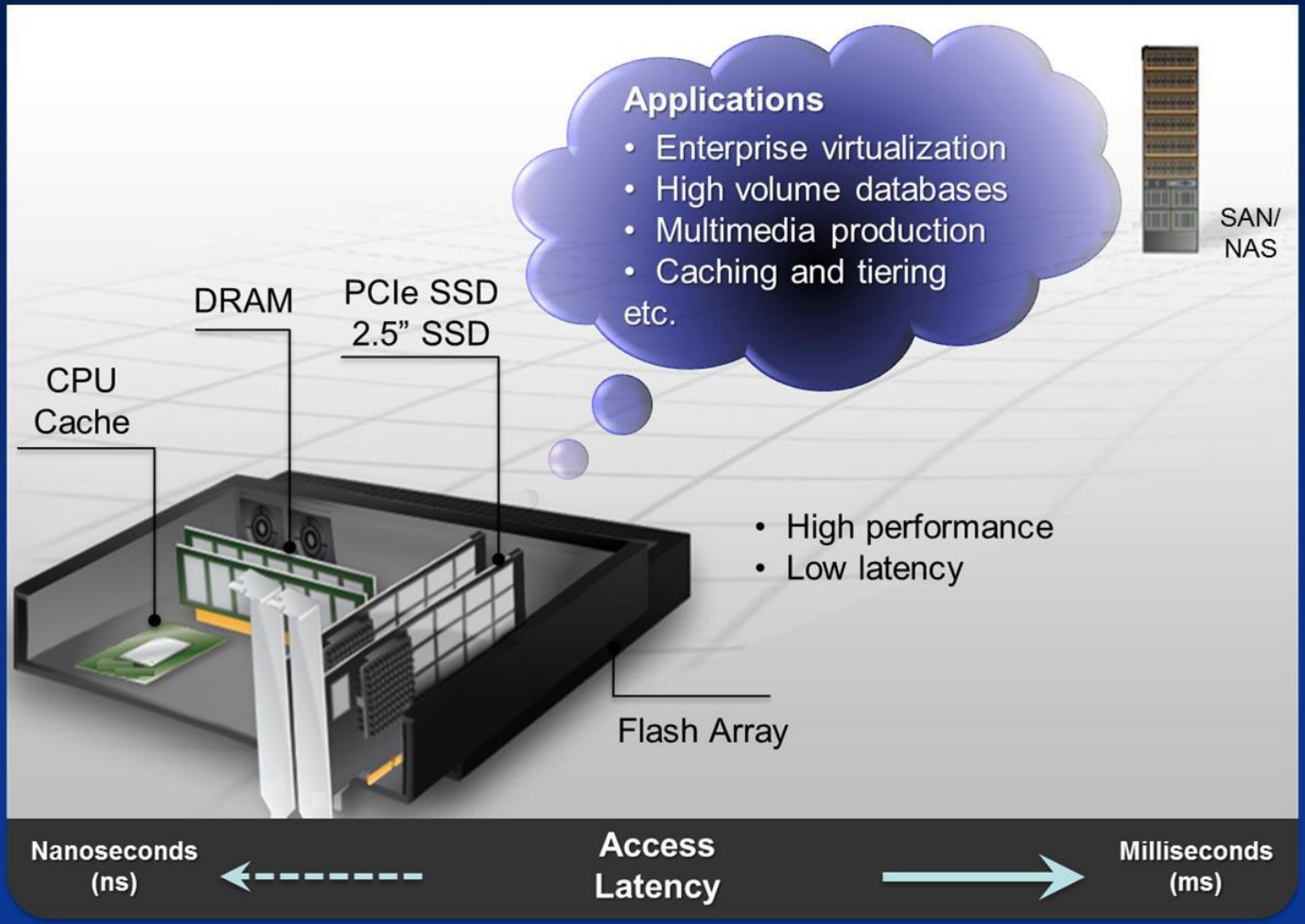
DEFINING THE PROBLEM

Performance Bottleneck

- Storage Access Becomes the Bottleneck



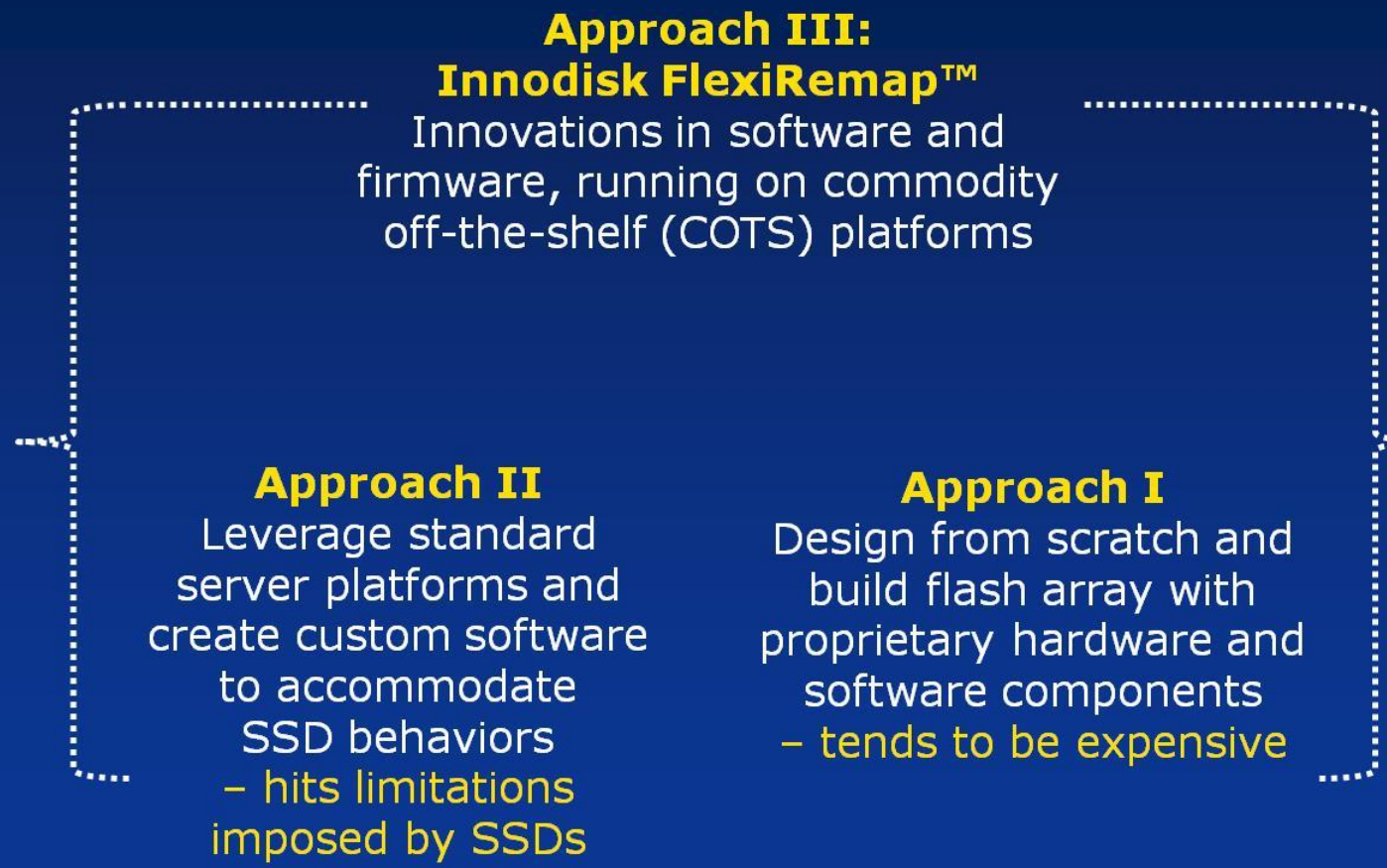
Storage for Cloud Computing



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

Ways to Build Flash Arrays

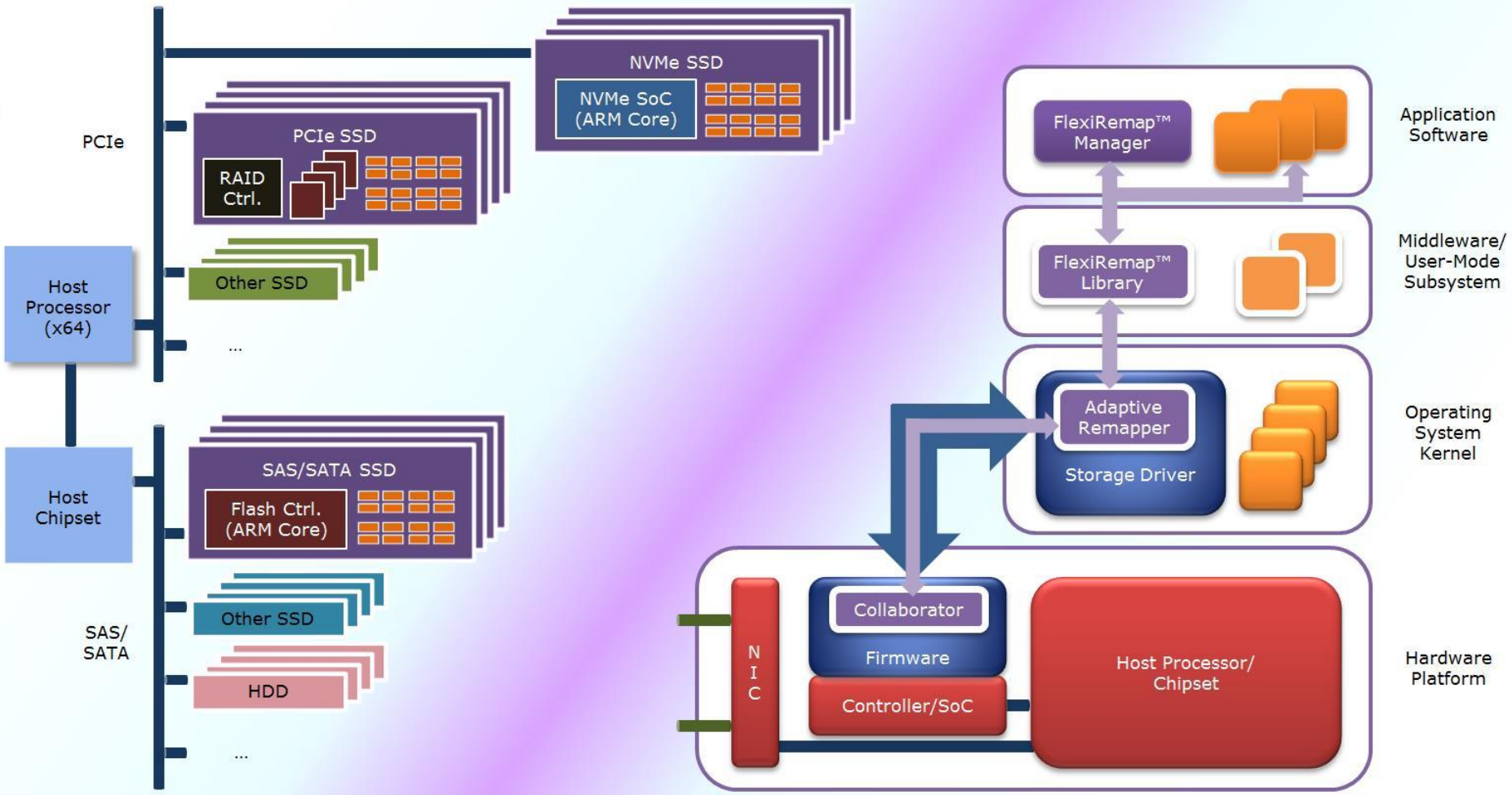


OUR SOLUTION: INNODISK FLEXIREMAP™ TECHNOLOGY

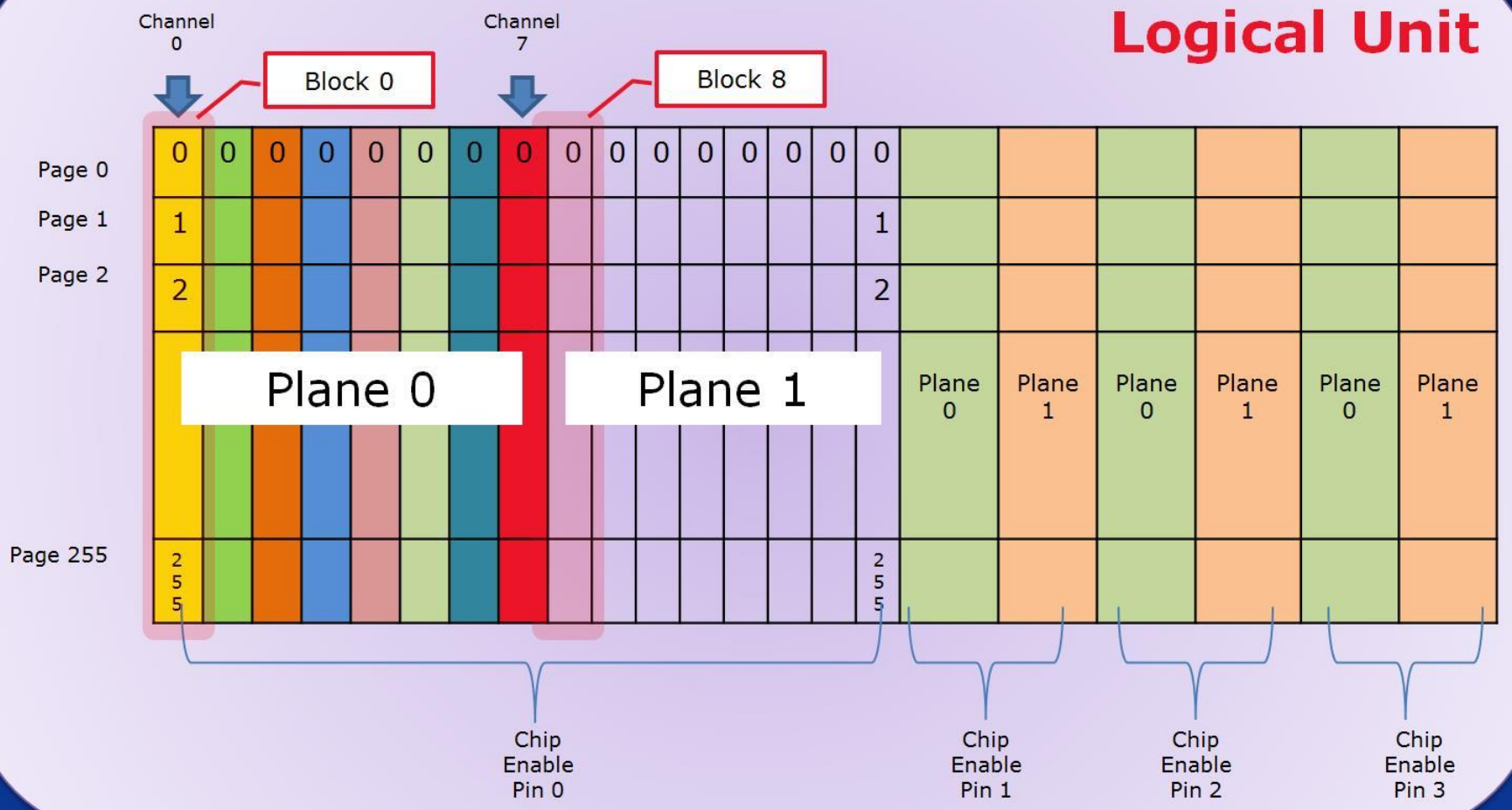
FlexiRemap™ Technology

- Innodisk FlexiRemap™ Technology Features:
  - An adaptive FTL implemented at OS kernel level
  - 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

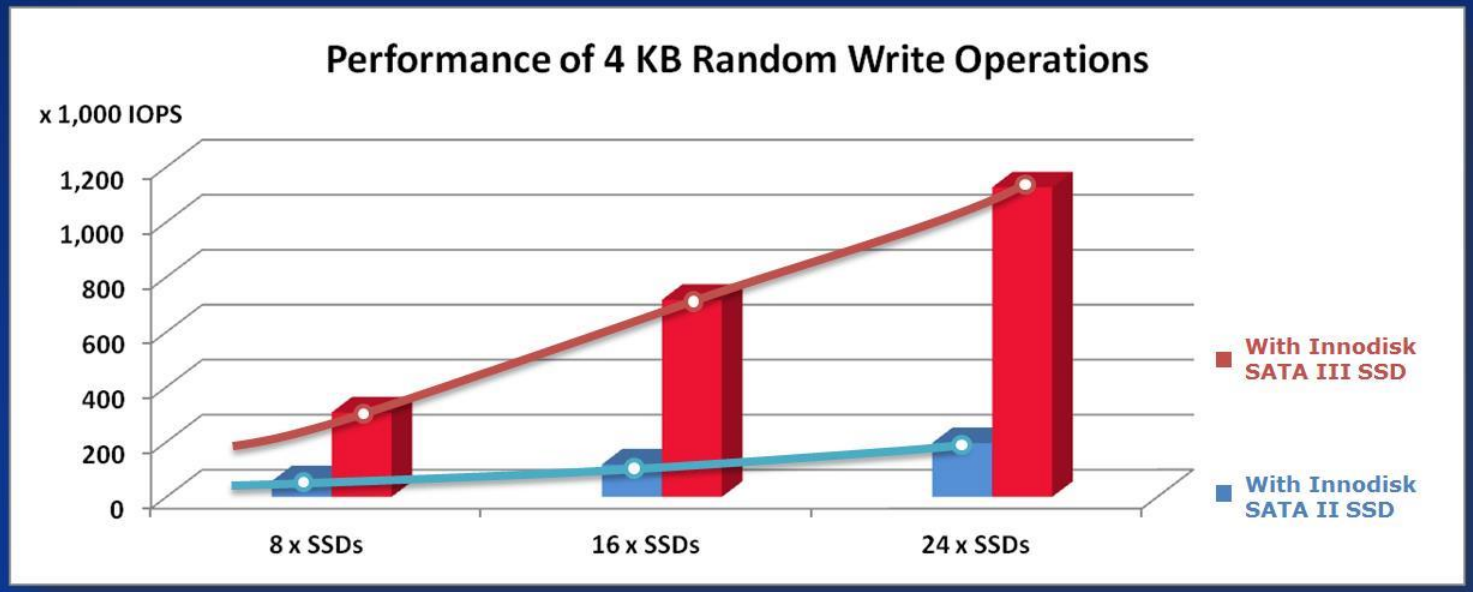


Direct Control to Flash Memory



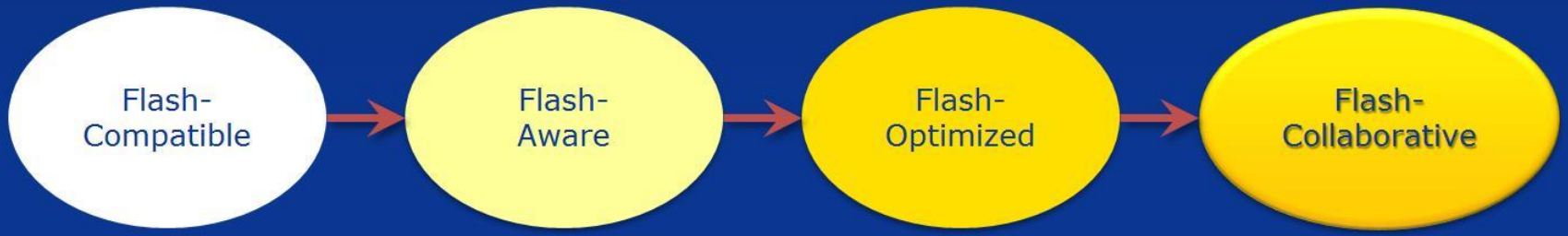
Scalable Performance

- 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

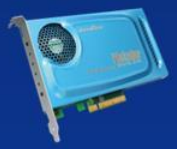
- Highest Performance on Standard Architecture
  - From flash-compatible to flash-collaborative
  - Achieves sustained high IOPS through close collaboration between upper-layer software and underlying firmware
  - Built upon commodity off-the-shelf (COTS) platforms and components, without need for custom-made, 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
Capacity	1,152 GB	3,072 GB
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

Calls to Action

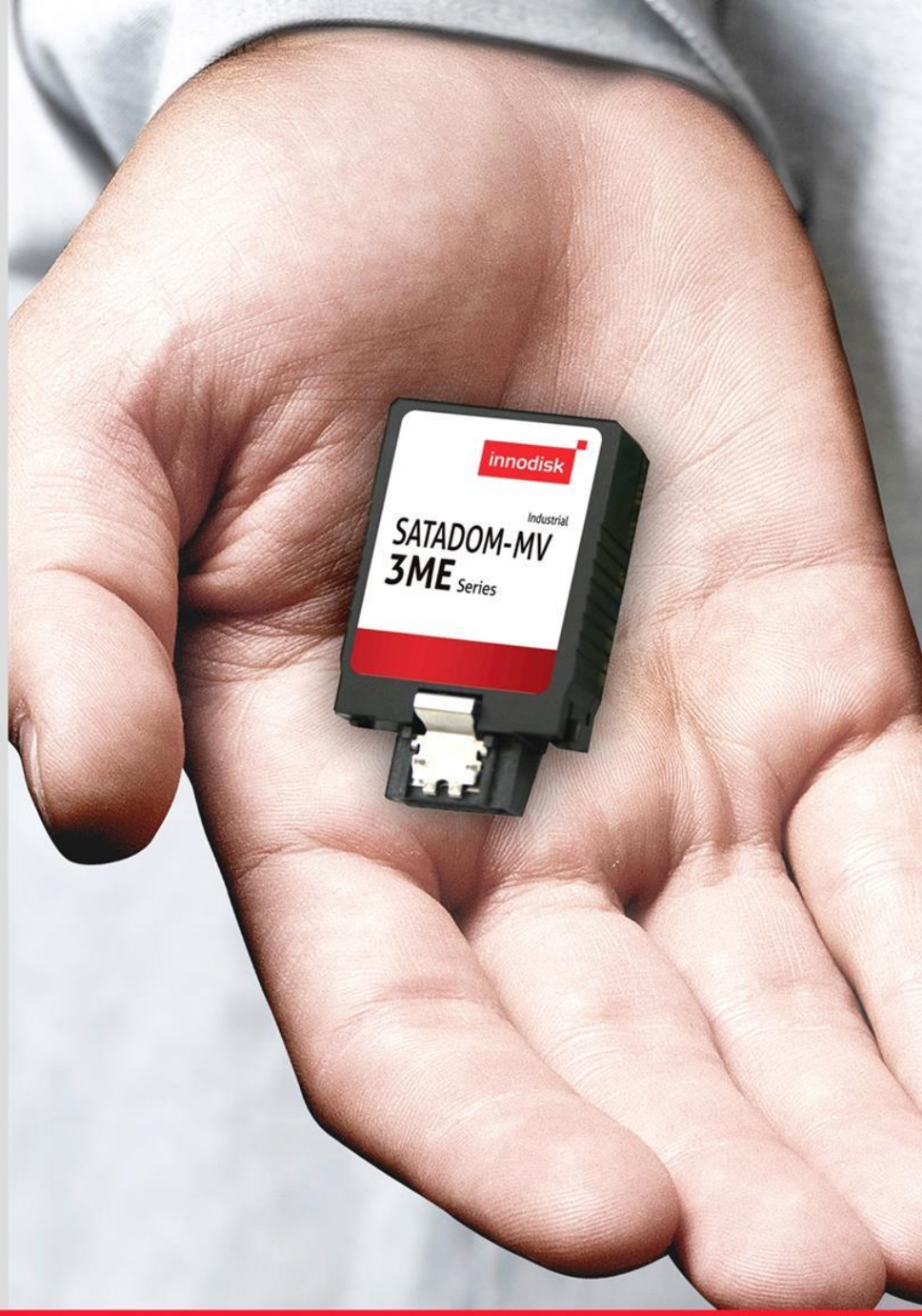
- Visit Innodisk Booth at Flash Memory Summit
  - Check out live demonstration of Innodisk FlexiRemap™ technology and Innodisk FlexiArray™ storage appliance
- Go to http://flexiarray.innodisk.com/ for Additional Information
- Send Your Inquiries to cloudsolution@innodisk.com

THANK YOU

innodisk

Innodisk Corporation | 宜鼎國際股份有限公司

設計 Design | 服務 Service | 品質 Quality | 交期 Delivery



** Information in this presentation is provided on an 'as is' basis and subject to change without prior notice.