NVMe Windows Driver

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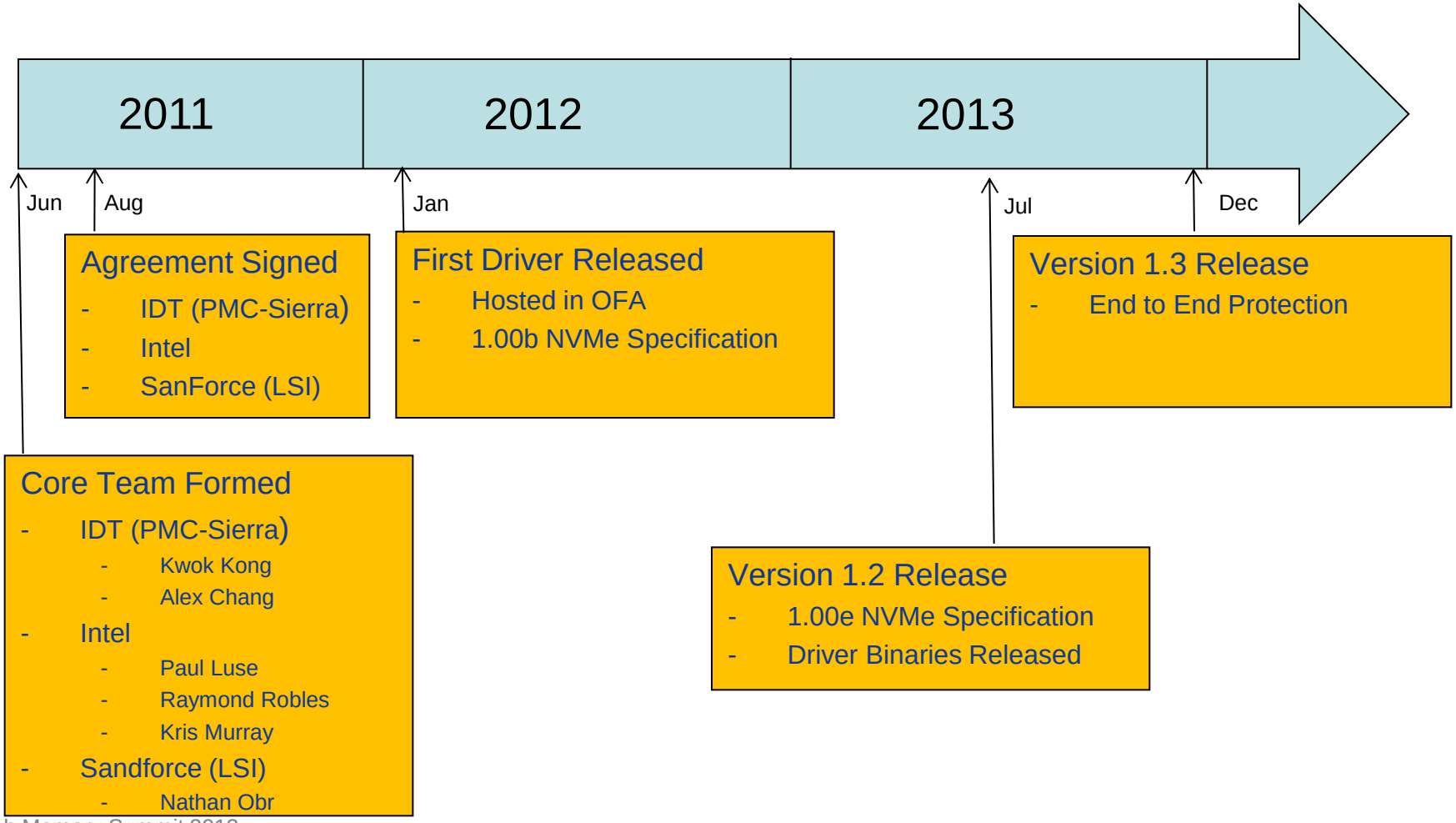
Agenda

- Past, Present and Future
- Driver Architecture
- Driver Features
- Future Features

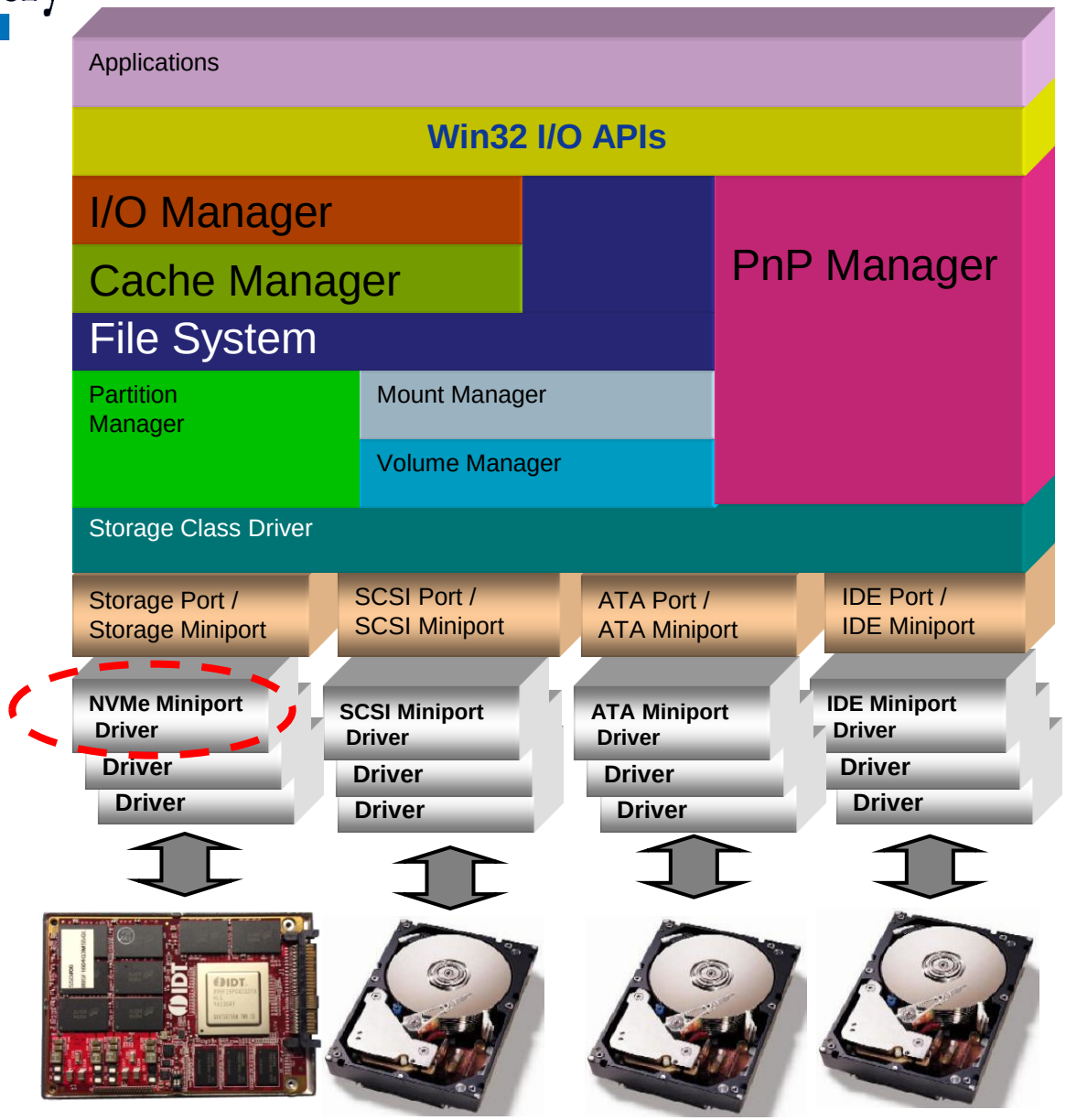
Some Notes about this template

- The first action you should take is to save this presentation
  - You have opened a design template (.pot)
    - Need to save as .ppt
- A master exists for:
  - Slides
  - Handouts - default is 3 to a page
    - You can print a different number, but no guarantees about appearance
  - Notes

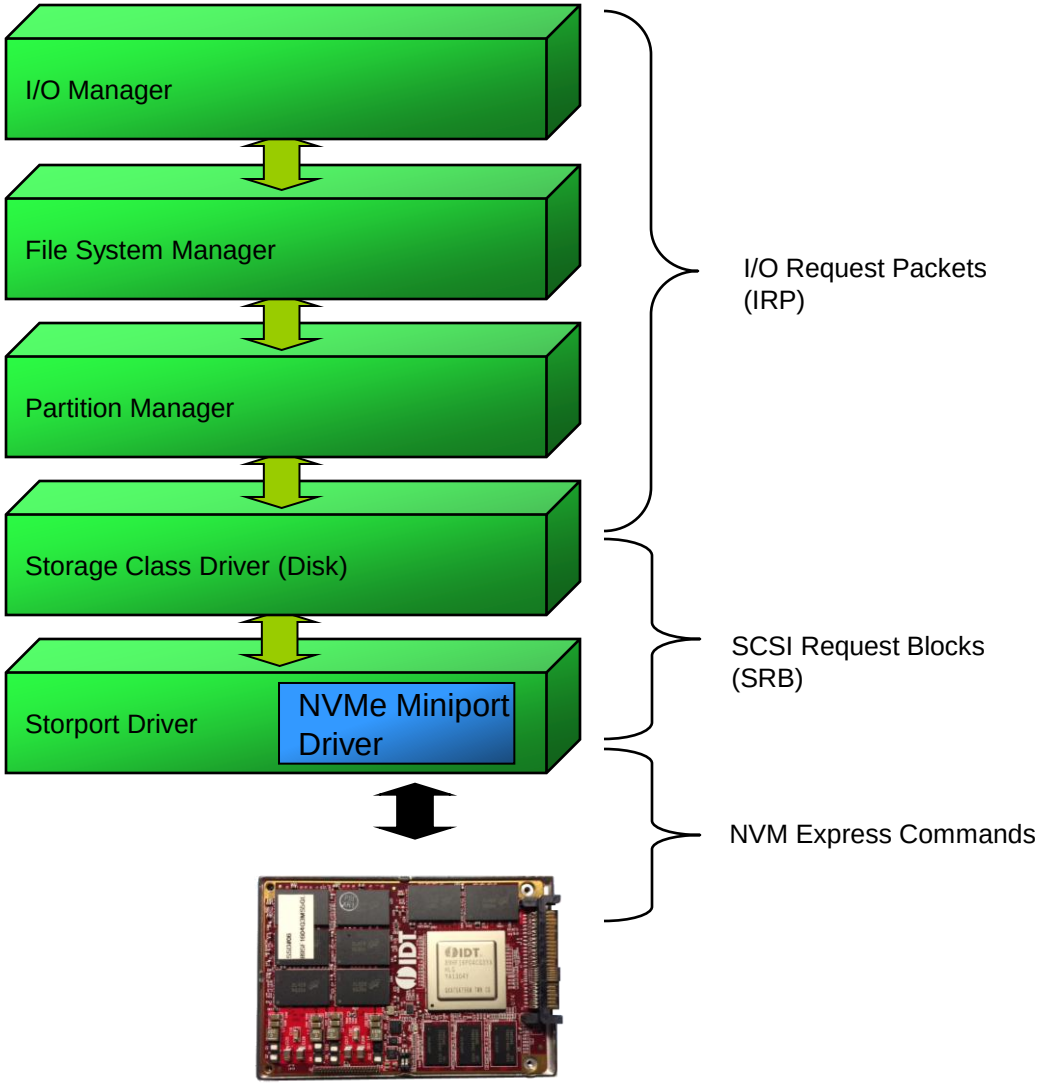
Past, Present and Future



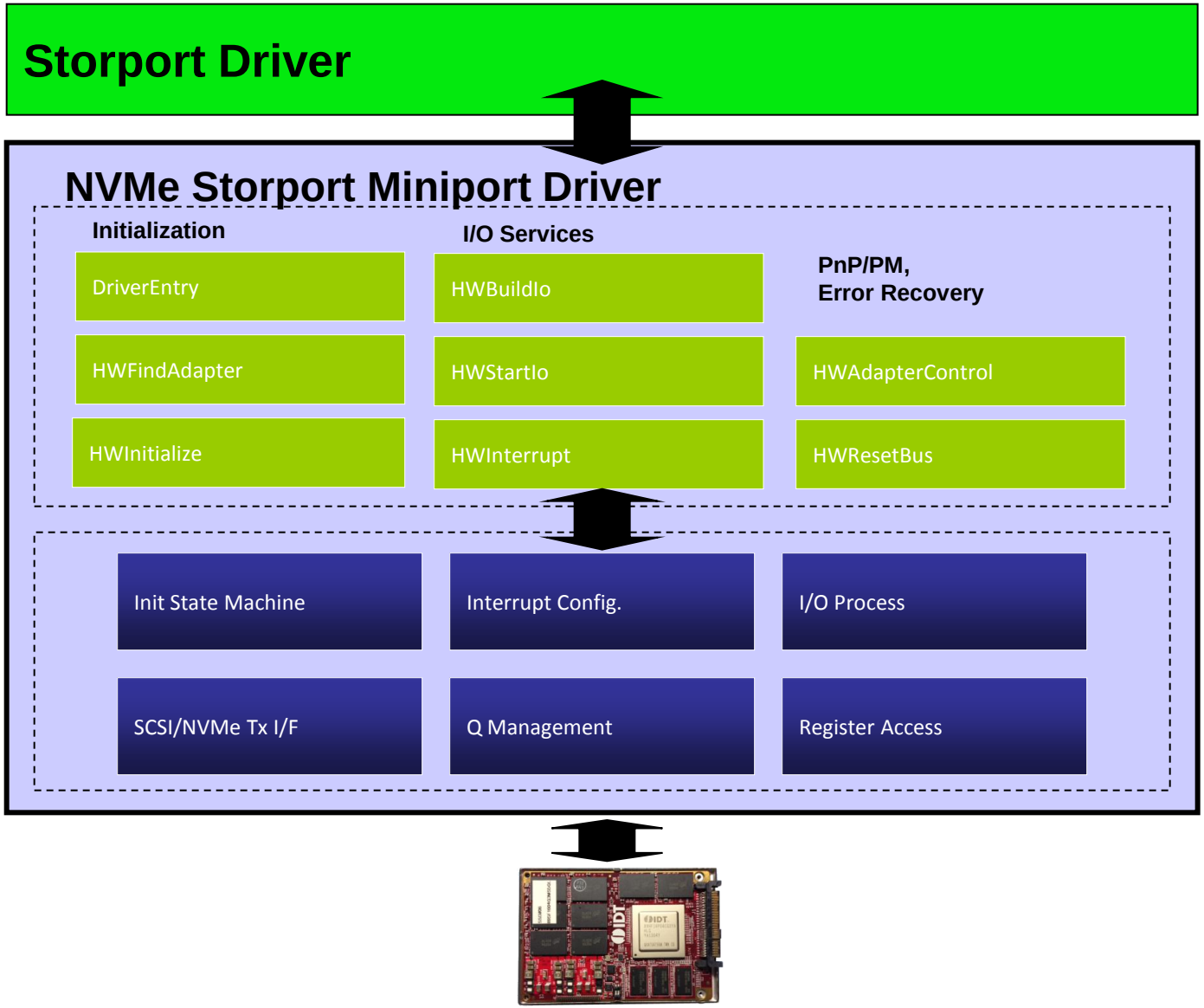
Windows Storage Architecture



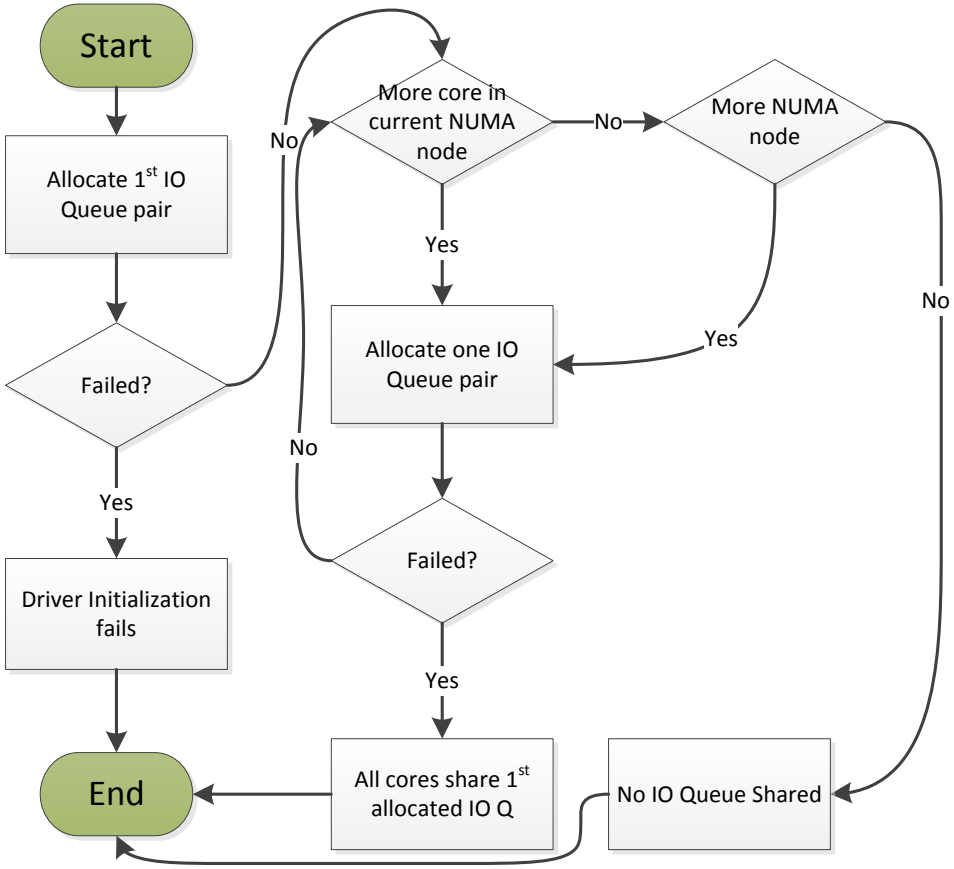
Storport Driver Stack



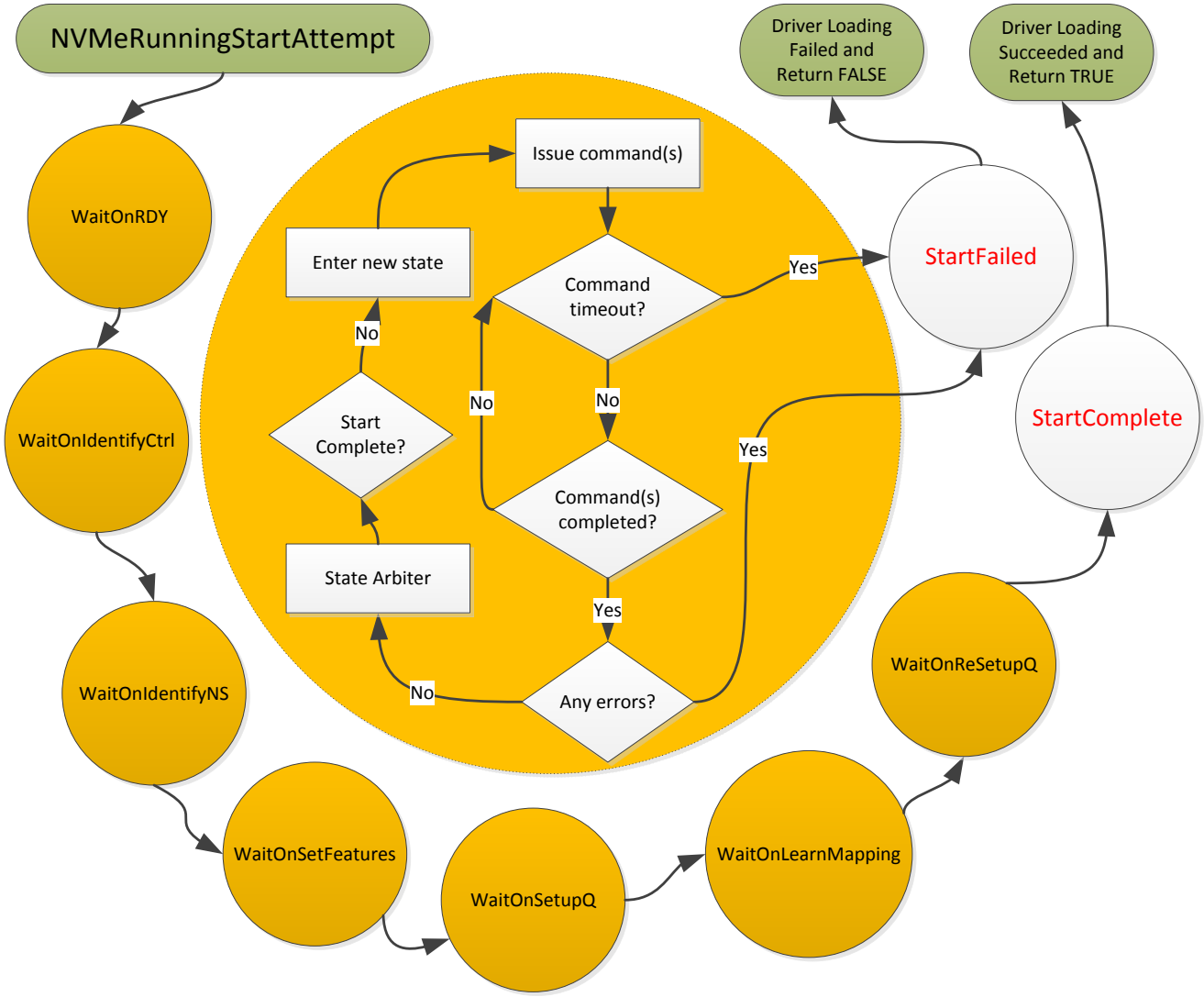
Driver Architecture



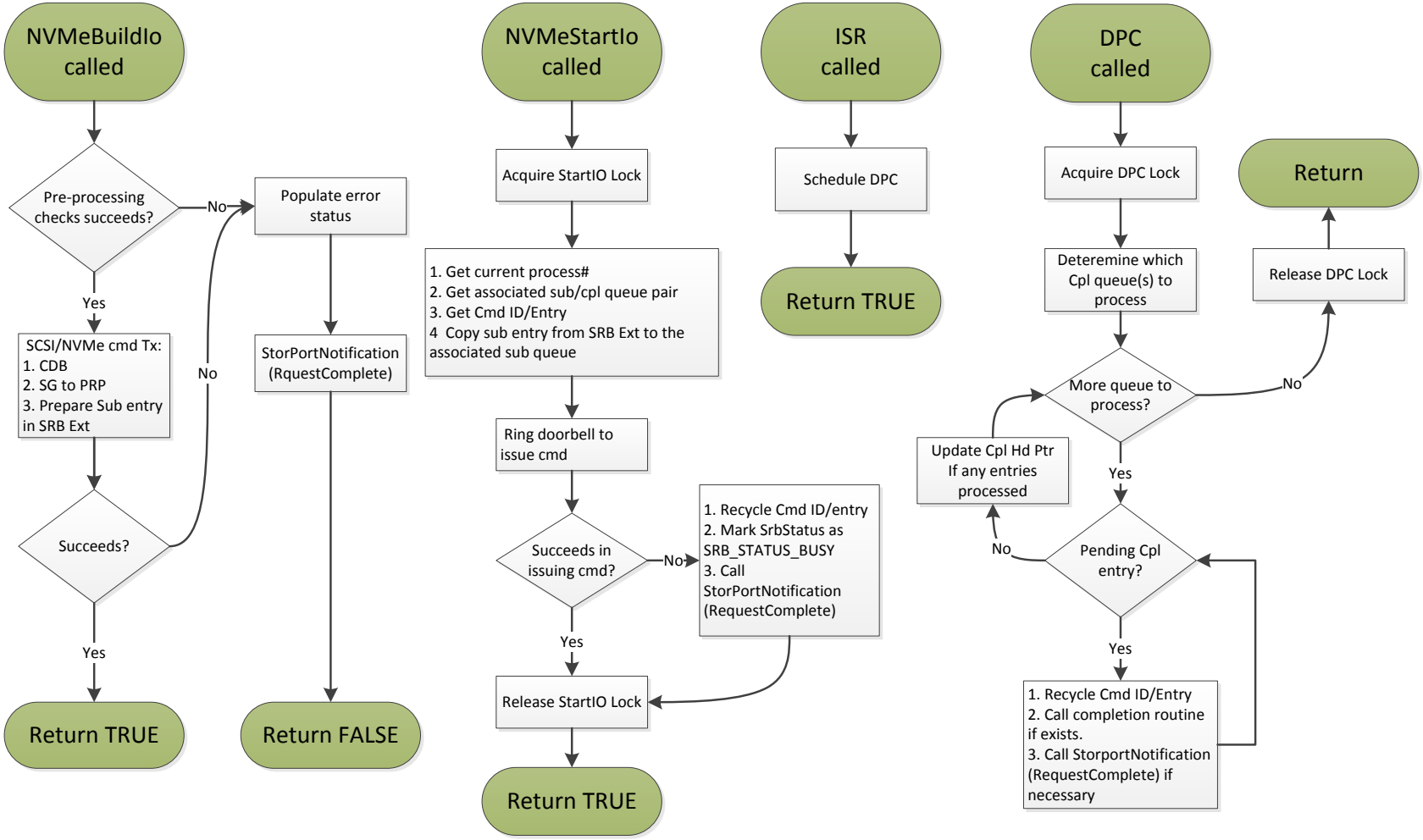
IO Queue Allocation Diagram



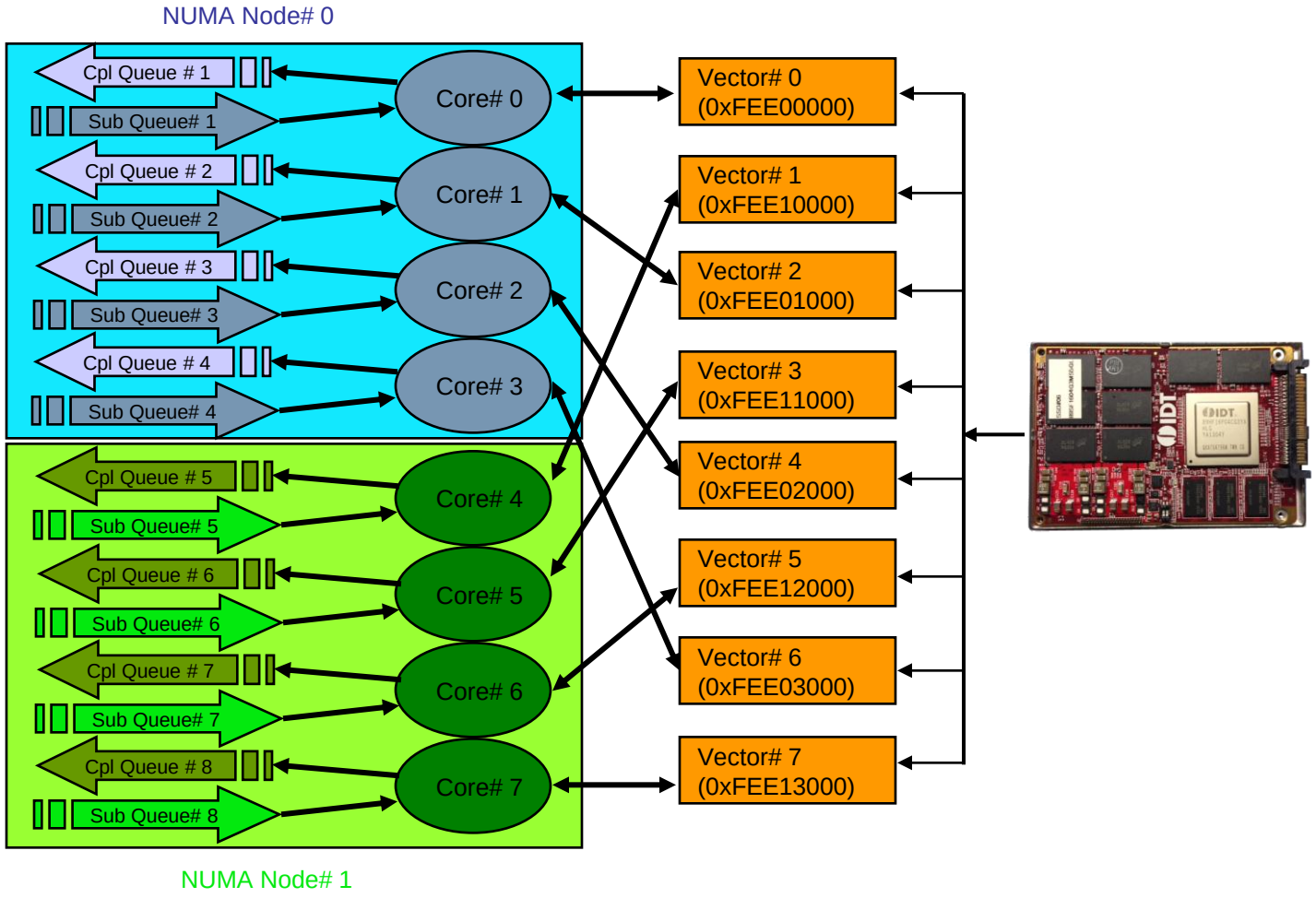
Driver Initialization State Machine



IO Process Diagram (Read)



Queue-Core-Vector Mappings



System Features Overview

Features	Supported
Windows Versions (64-bit only)	7, 8, Server 2008R2, Server 2012
NUMA Optimized Queues and Memory	Dedicated IO queues per CPU core Single Admin Queue for all CPU cores Queue memory allocated local to NUMA Node
Interrupt	MSI-X (Vectors mapped to NUMA optimized IO Queue Pairs) MSI INTX
Queue Arbitration / Priority	Round Robin only 1:1 mapping between Submission and Completion queues
Pass Through	Yes (with DeviceIoControl())
Multiple Namespaces	Up to 16, Mapped to Bus 0, Tgt 0, LUN 0-15
Registry Parameters	Name Space, Max Transfer Size, Admin Queue Size, IO Queue size, Interrupt Coalescing Time/Entries)
End to End Protection	No

Admin command Sets

Commands	Native Support	Pass Through
Delete I/O Submission Queue	Yes	No
Create I/O Submission Queue	Yes	No
Get Log Page	Yes	Yes
Delete I/O Completion Queue	Yes	No
Create I/O Completion Queue	Yes	No
Identify	Yes	Yes
Abort	No	No
Set Features	Yes	Yes
Get Features	Yes	Yes
Asynchronous Event Request	Yes	No
Firmware Activate	No	Yes
Firmware Image Download	No	Yes
Format NVM	No	Yes
Security Send	Yes	Yes
Security Receive	Yes	Yes
Vendor specific	No	Yes

NVM command Sets

Commands	Native Support	Pass Through
Flush	Yes	Yes
Write	Yes	No
Read	Yes	No
Write Uncorrectable	No	Yes
Compare	No	Yes
Dataset Management	Yes (Deallocate)	Yes
Vendor specific	No	Yes

Future Features

- 1.3 Release (end of 2013)
  - Windows 32-bit
  - End to End Protection
  - NVM Format Enhancement
- 2014 and Beyond
  - NVMe 1.1 Features
  - Need your contribution to write the future

Useful Information

- Join the Driver Mailing List to Contribute
  - http://lists.openfabrics.org/cgi-bin/mailman/listinfo/nvmewin
- Development Tools Description
  - https://www.openfabrics.org/developer-tools/nvme-windows-development.html
- Driver Source Code
  - http://www.openfabrics.org/svnrepo/nvmewin/