

NVM Express® Host-Managed Live Migration

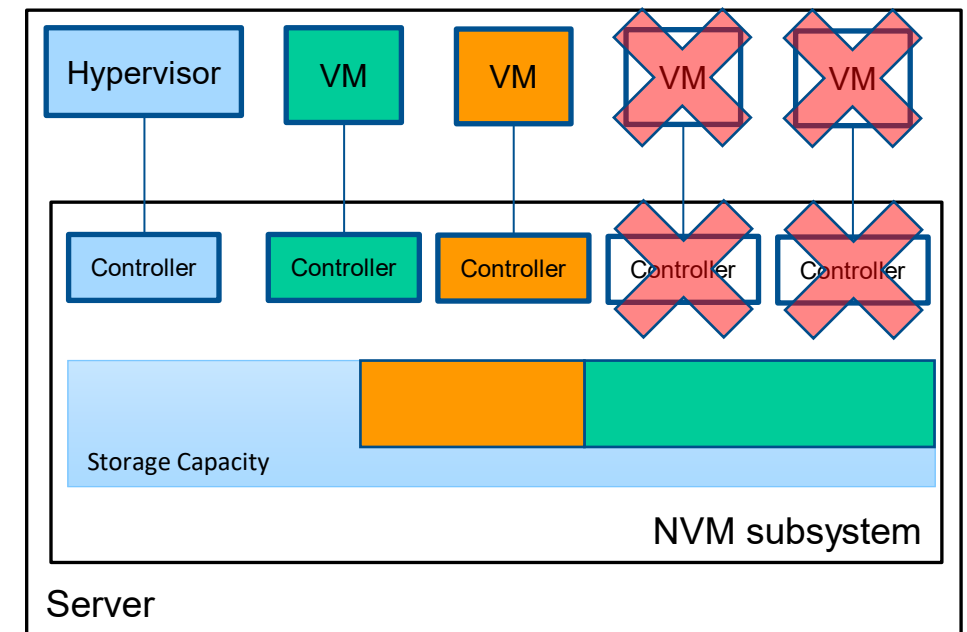
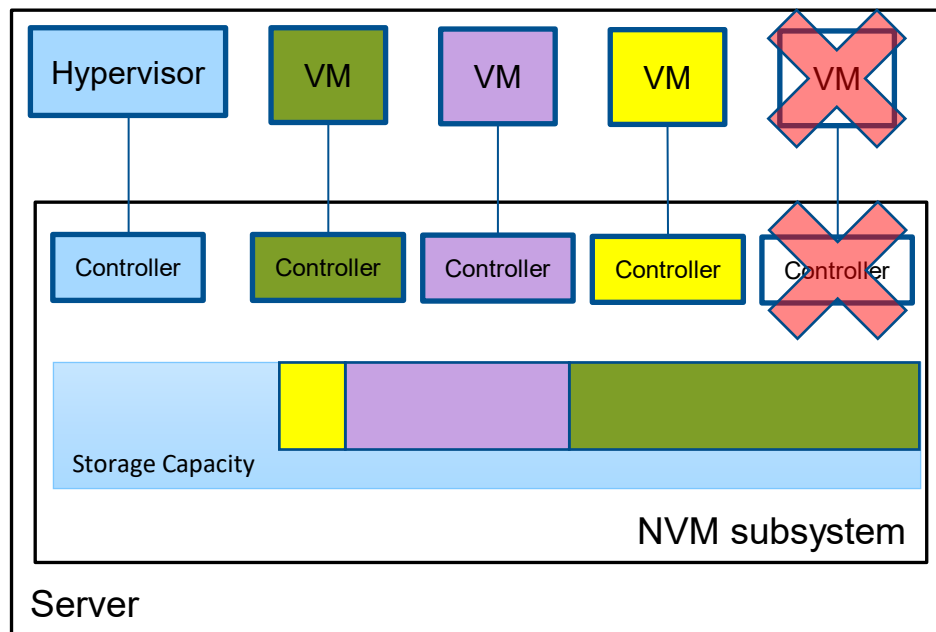
Mike Allison
Sr. Director NAND Product Planning – Standards
Samsung

A SNIA® Event

REGIONAL
SDC²⁴
BY Developers FOR Developers
APRIL 24, AUSTIN, TX

Why Live Migration in NVMe™?

- Key Use Cases:
 - Load balancing for a new workload

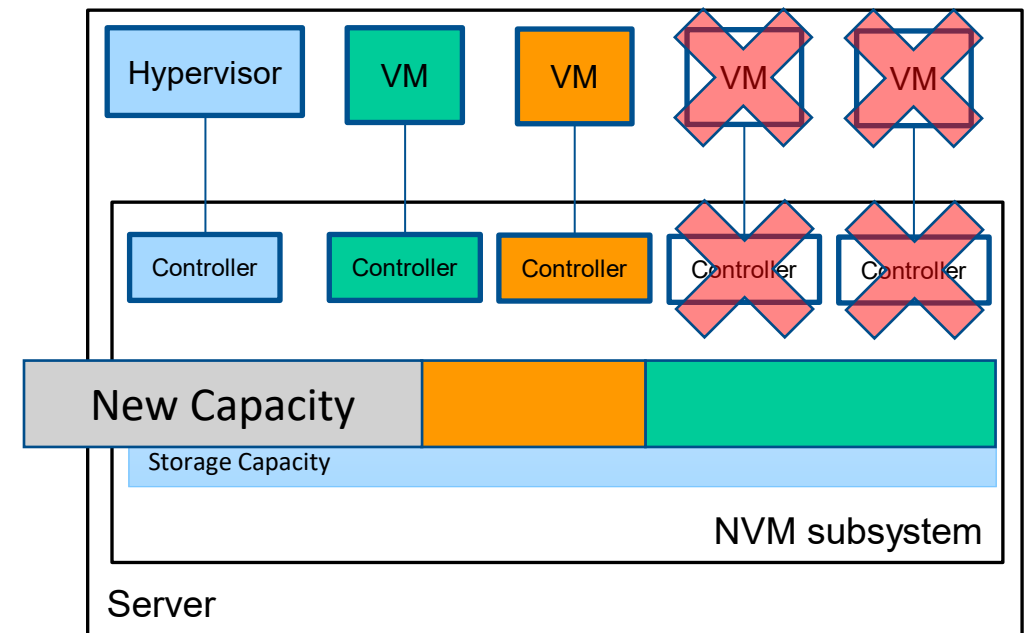
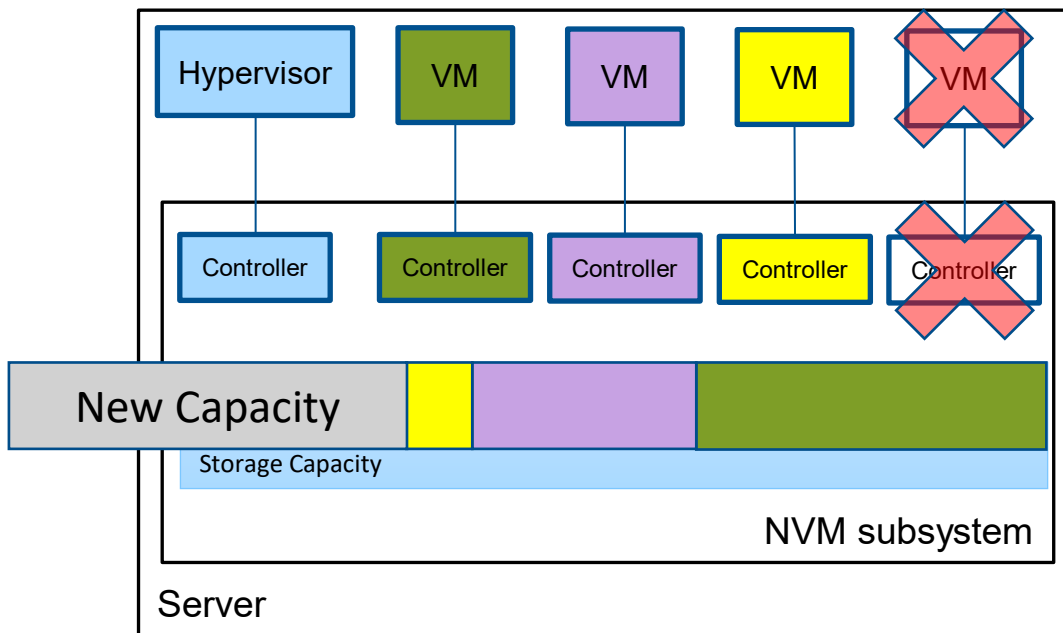


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New Capacity

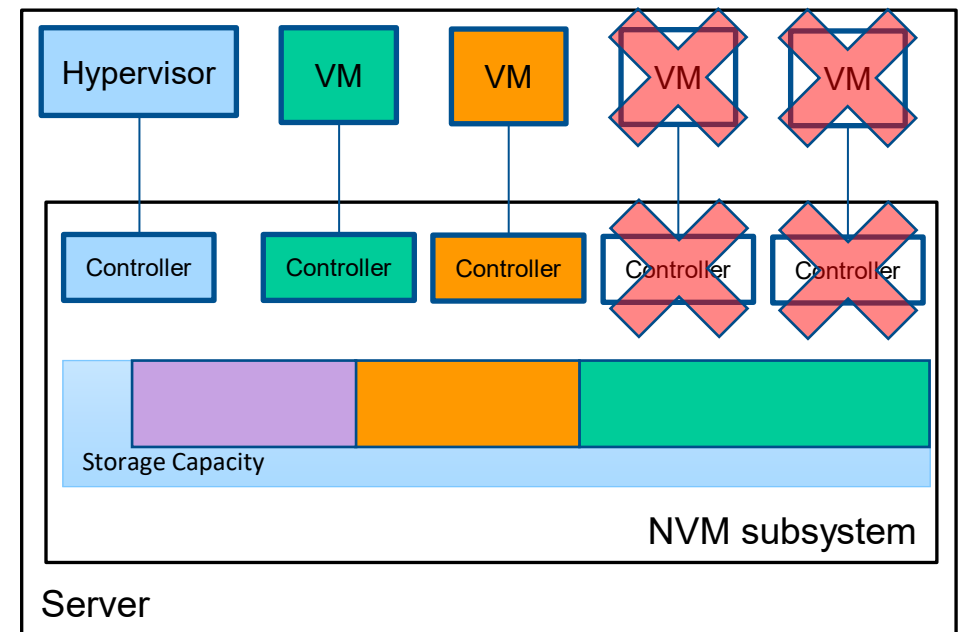
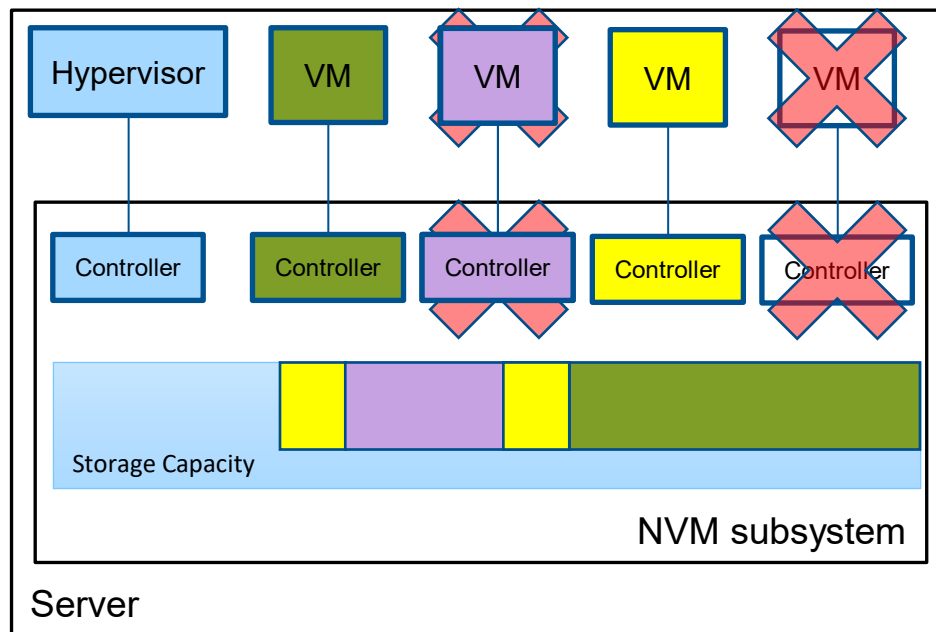


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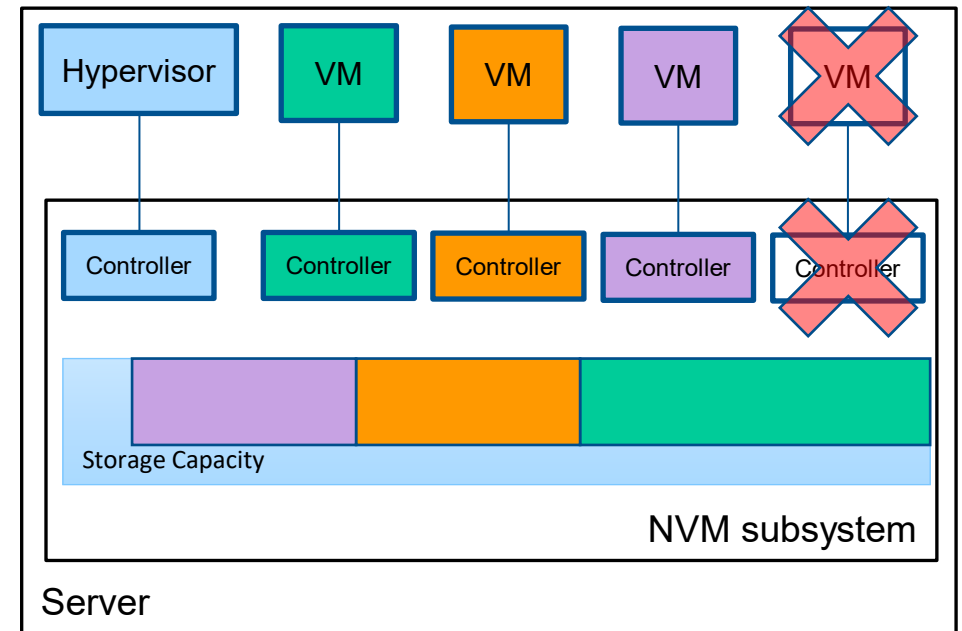
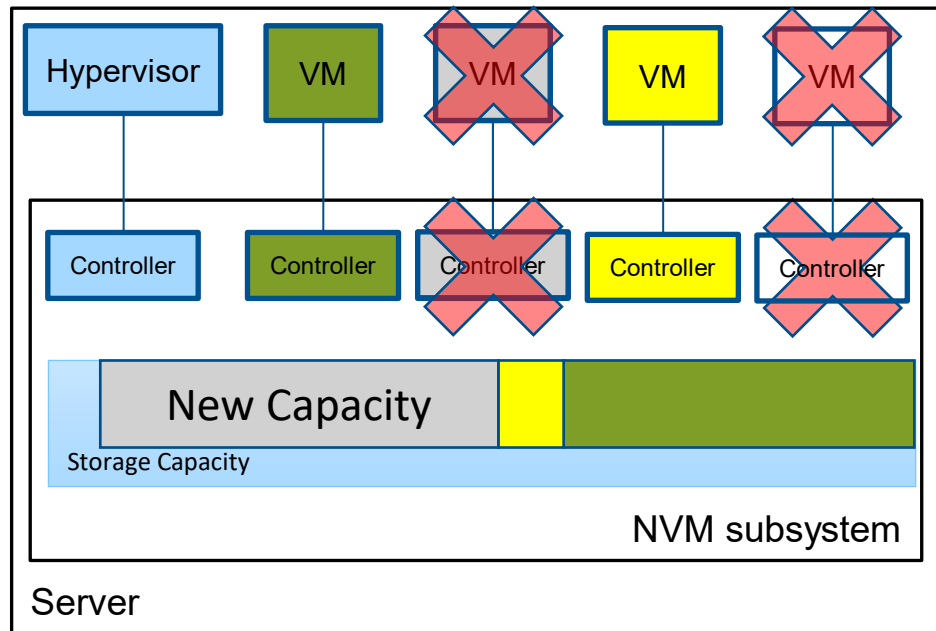


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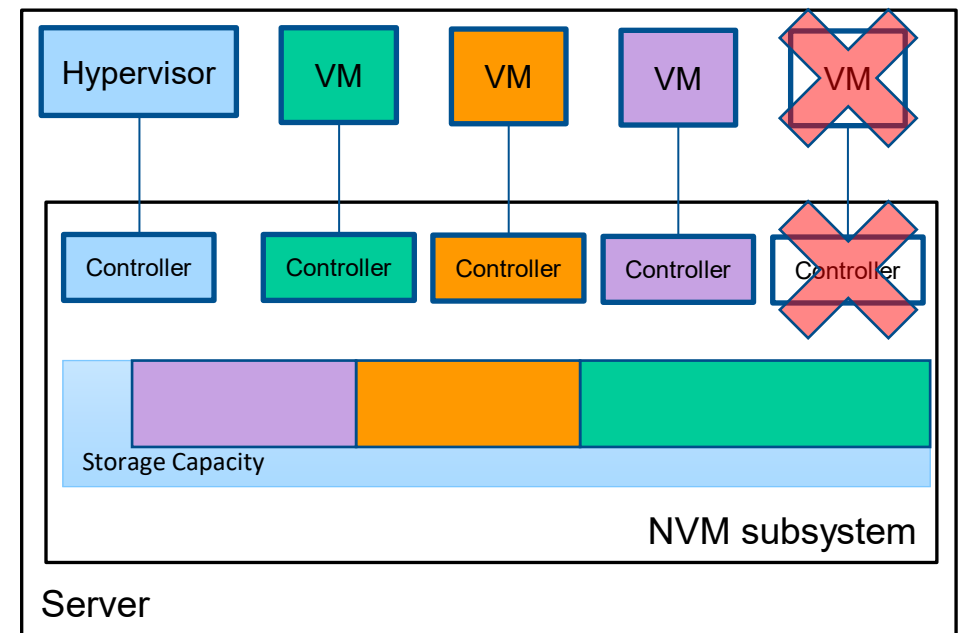
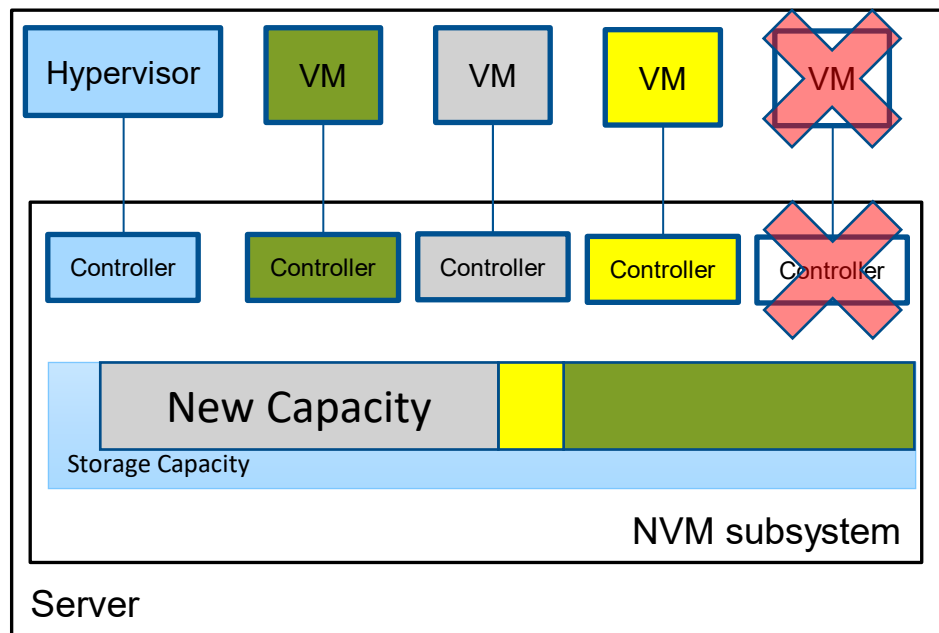
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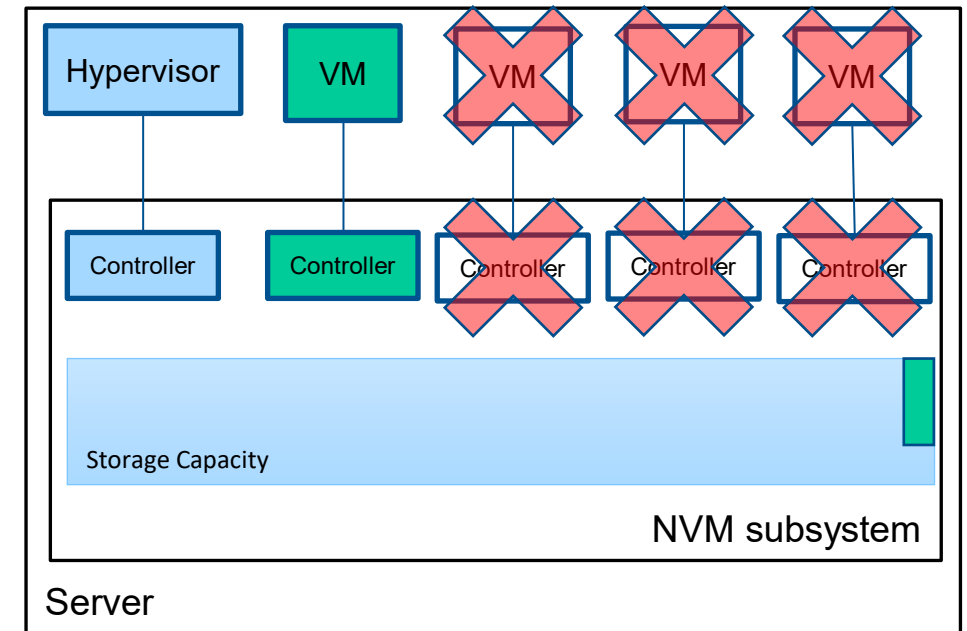
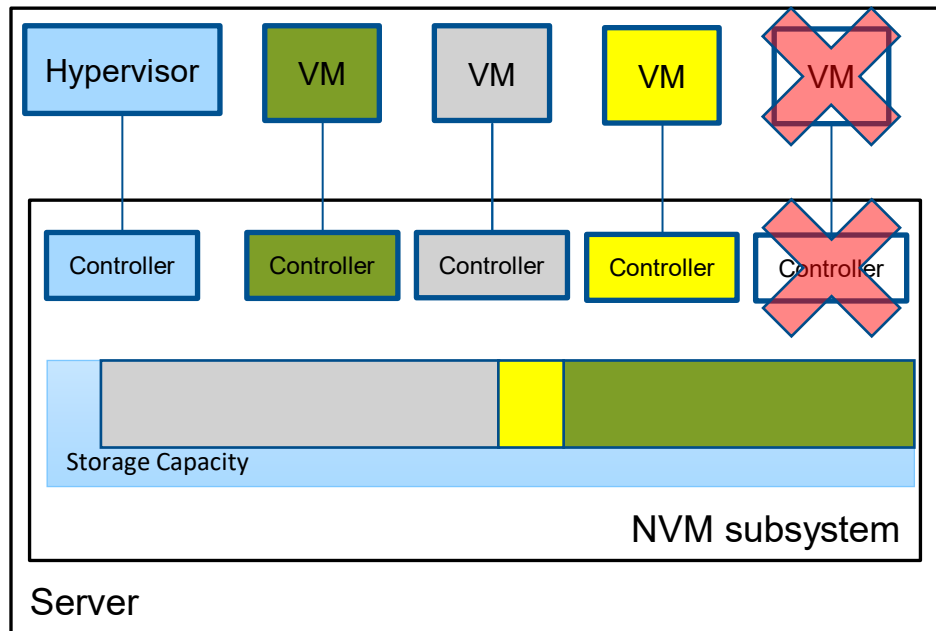
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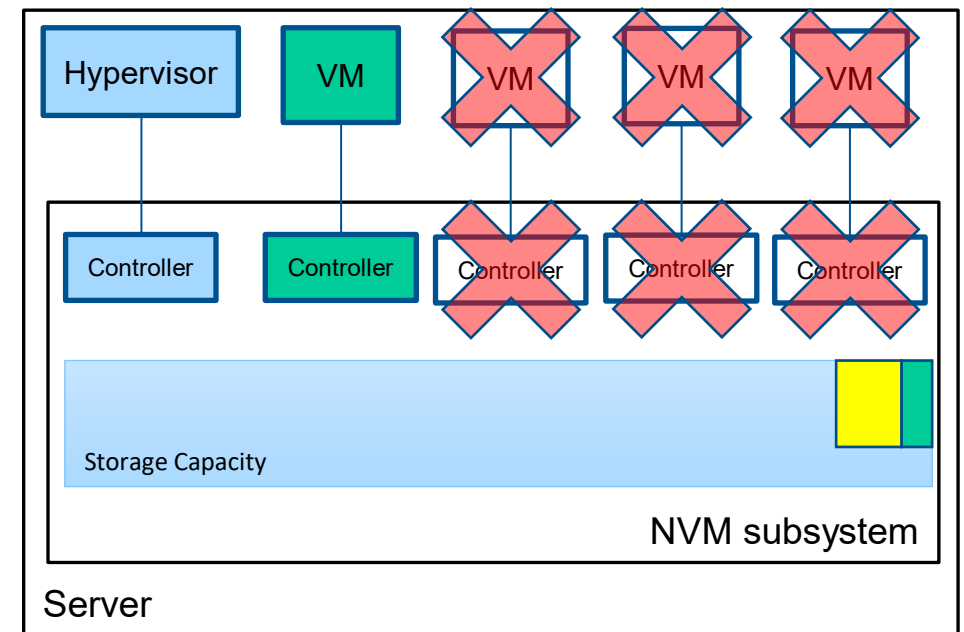
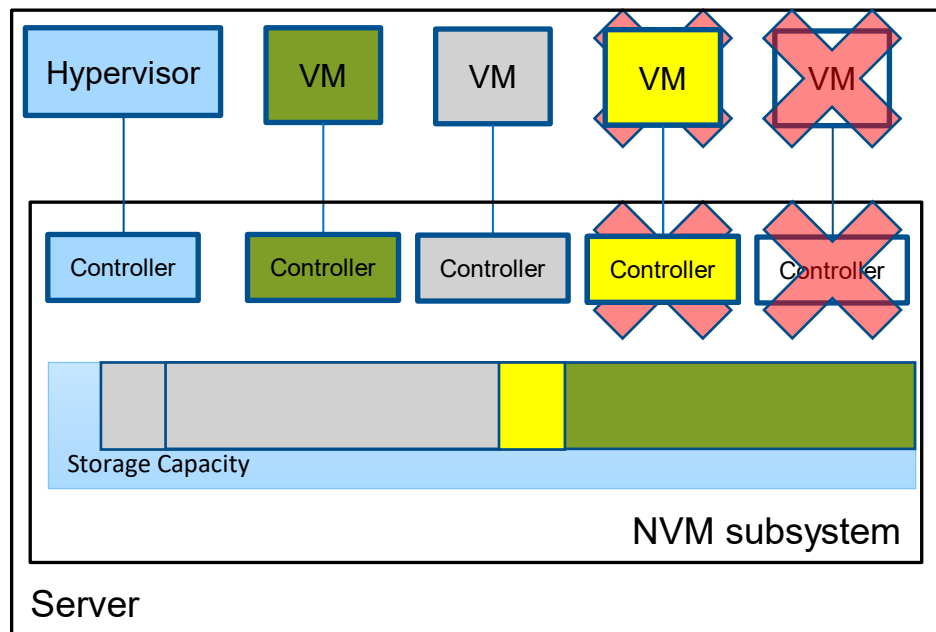
- Load balancing for a new workload
- Hardware maintenance



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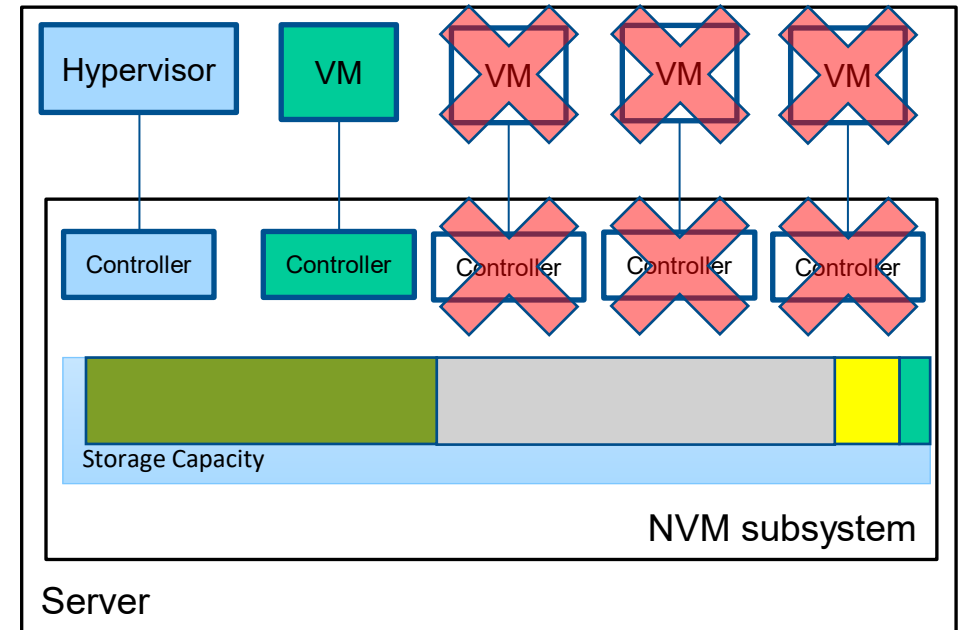
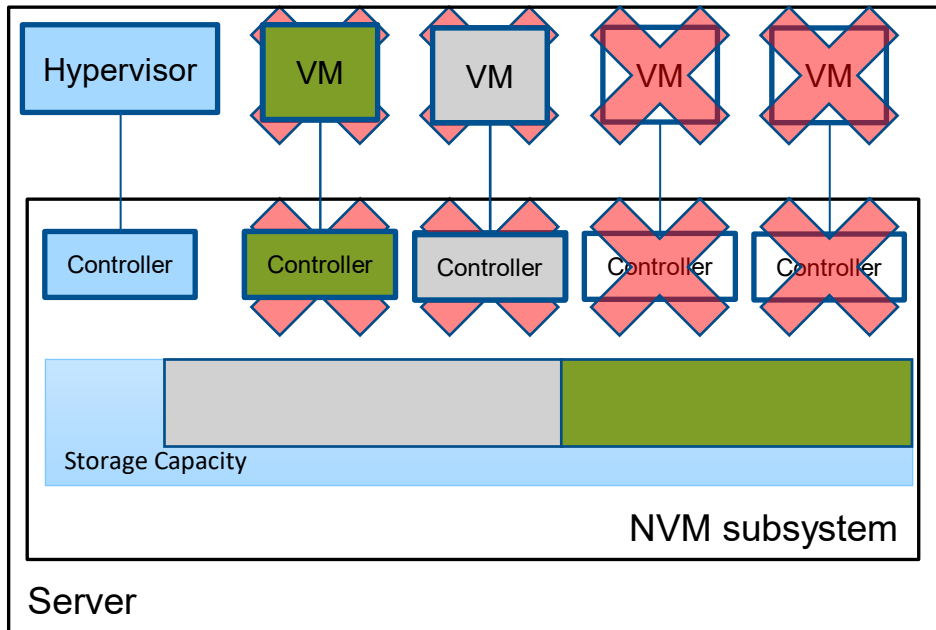
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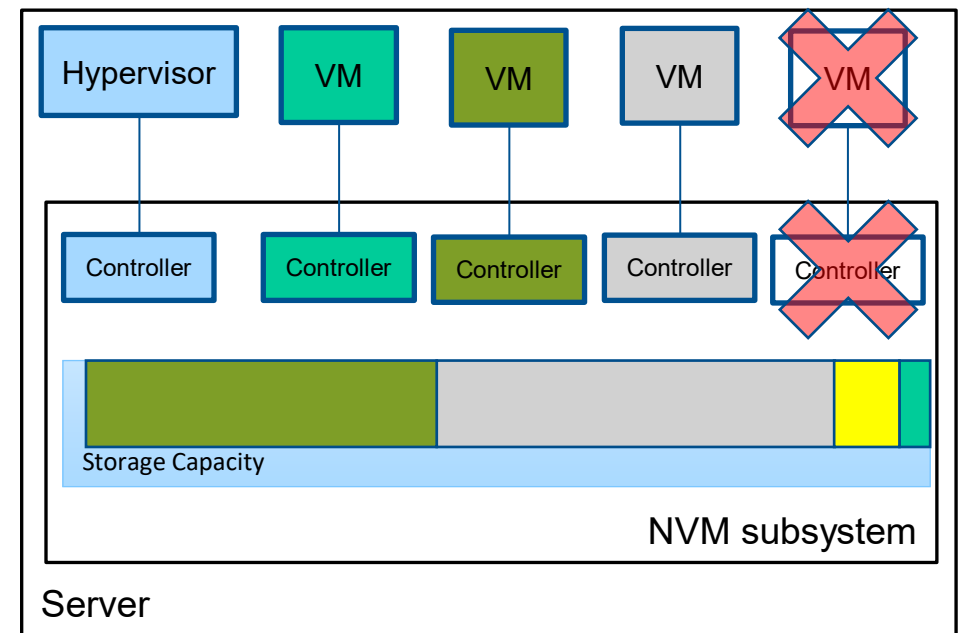
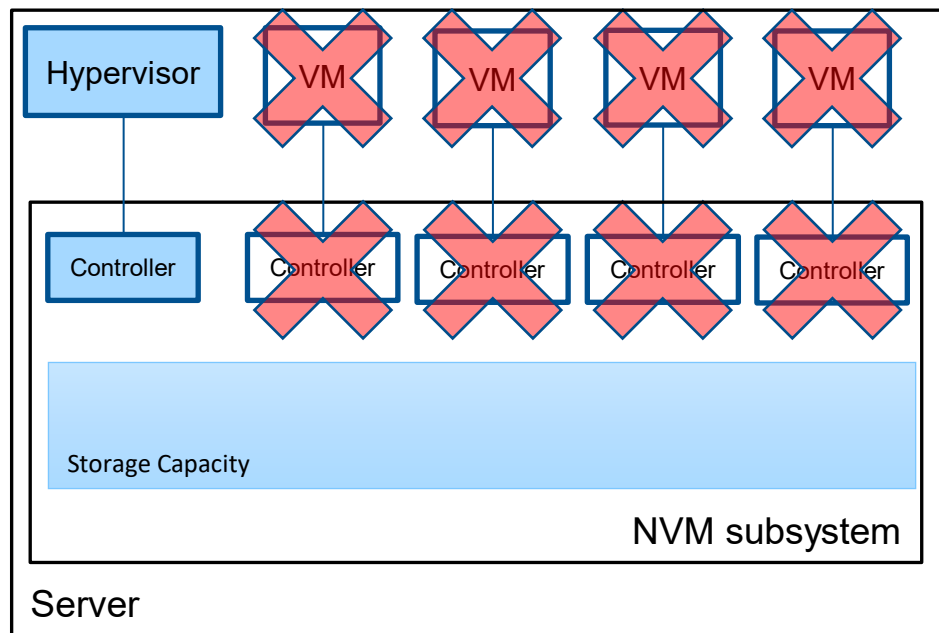
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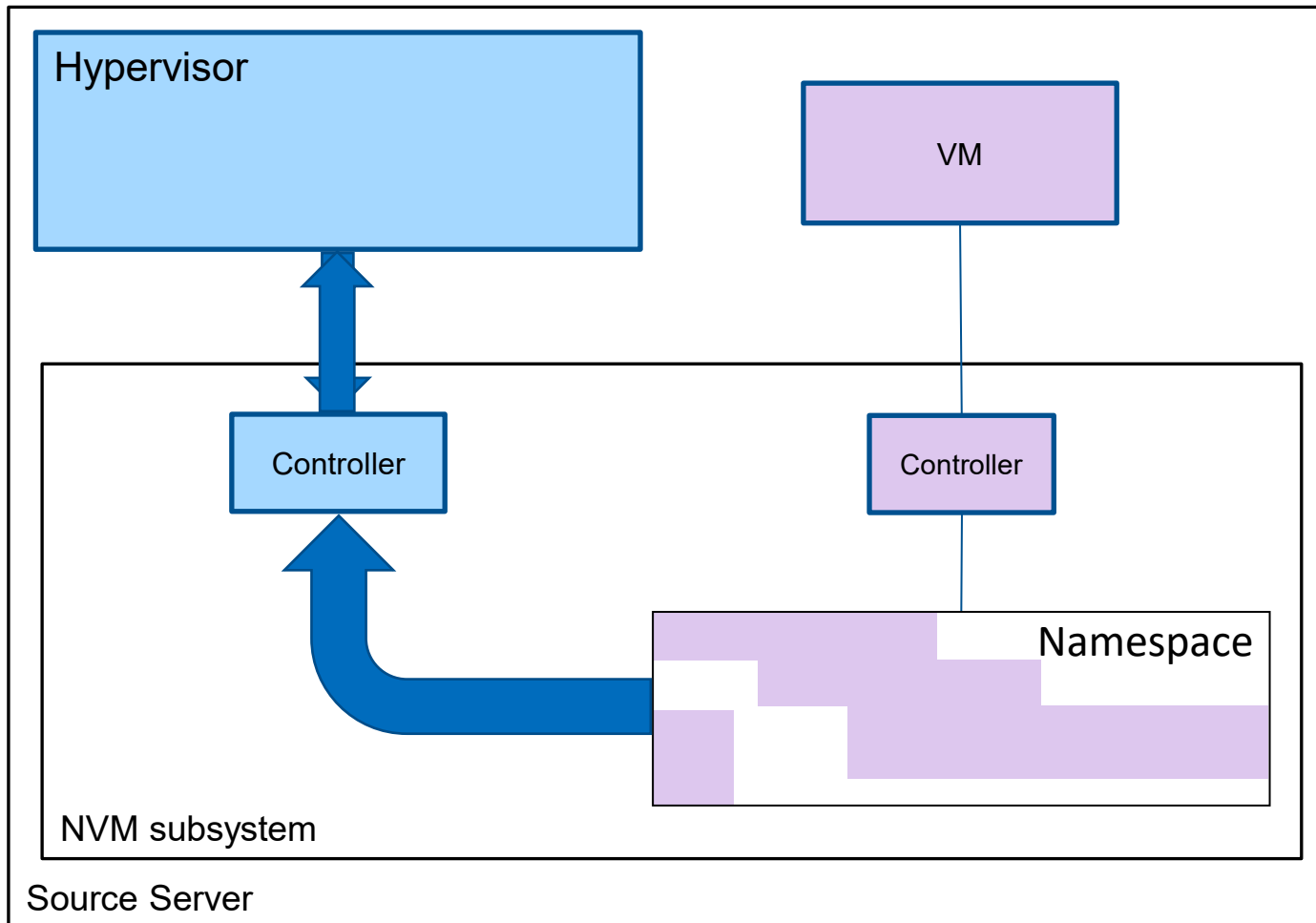
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NVMe™ Host Managed Live Migration

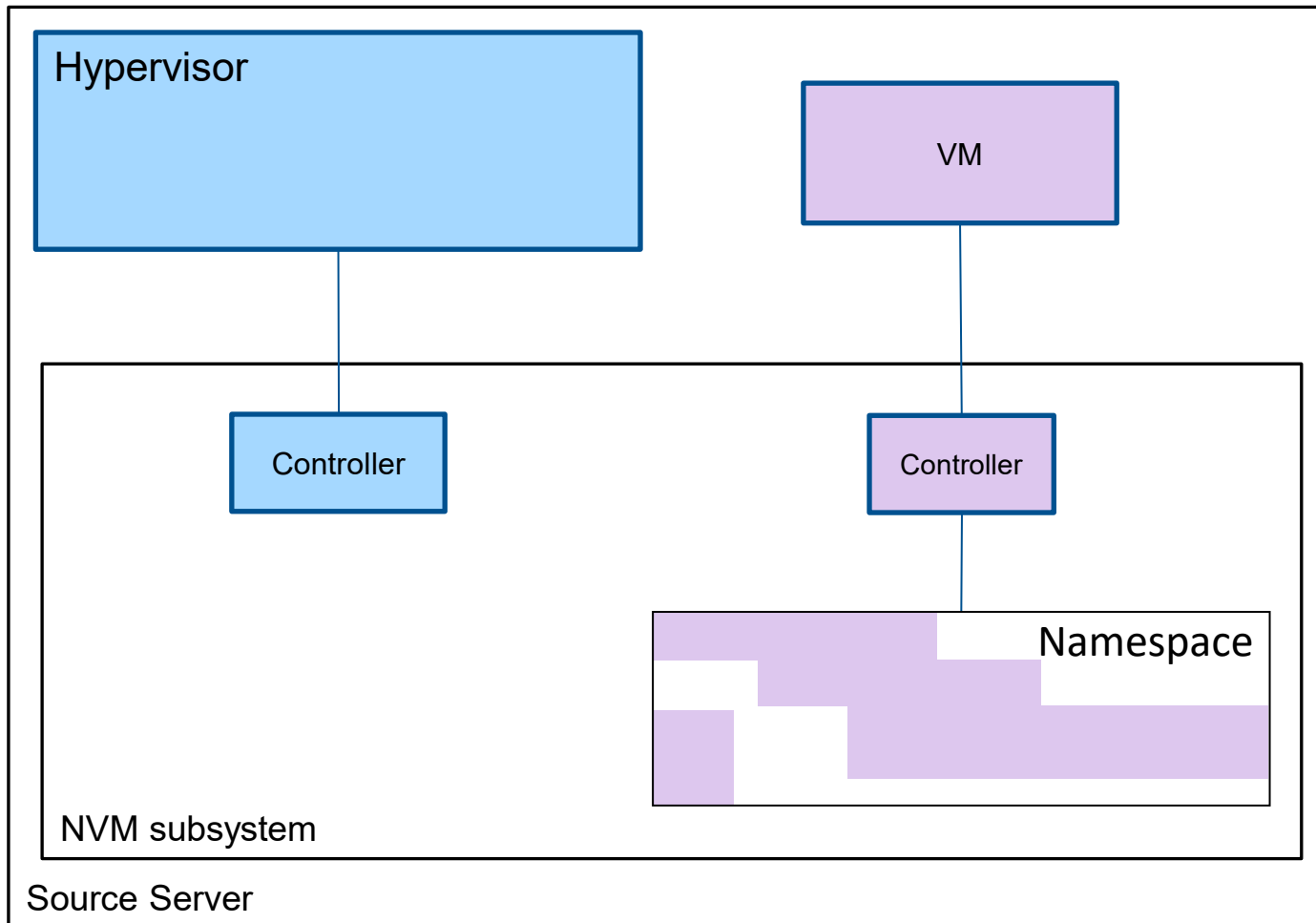
- NVMe Host Managed Live Migration provides services to a Host to:
 - Get the NVMe state from a source controller
 - Put that NVMe state into the target and resume operation
- Source NVM Subsystem
 - Read allocated logical blocks

NVMe™ Host Managed Live Migration



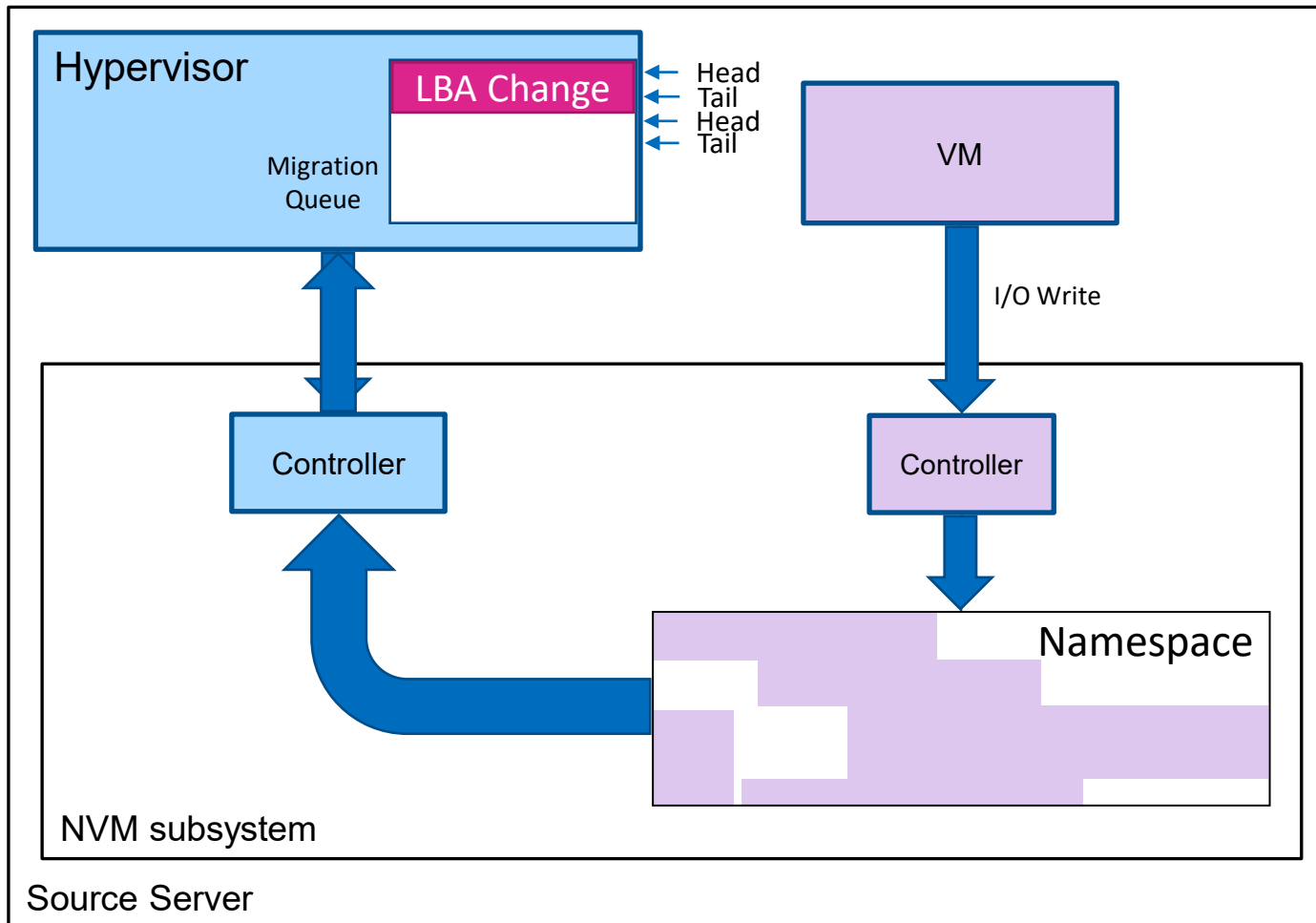
- Source NVM Subsystem
 - Read allocated logical blocks
 - Ratified TP4165 Tracking LBA Allocation with Granularity
 - Allows the host to request allocated LBA reporting
 - Controller reports sequential allocated LBAs on a reported granularity
 - Can be used for other use cases like Snapshots

NVMe™ Host Managed Live Migration



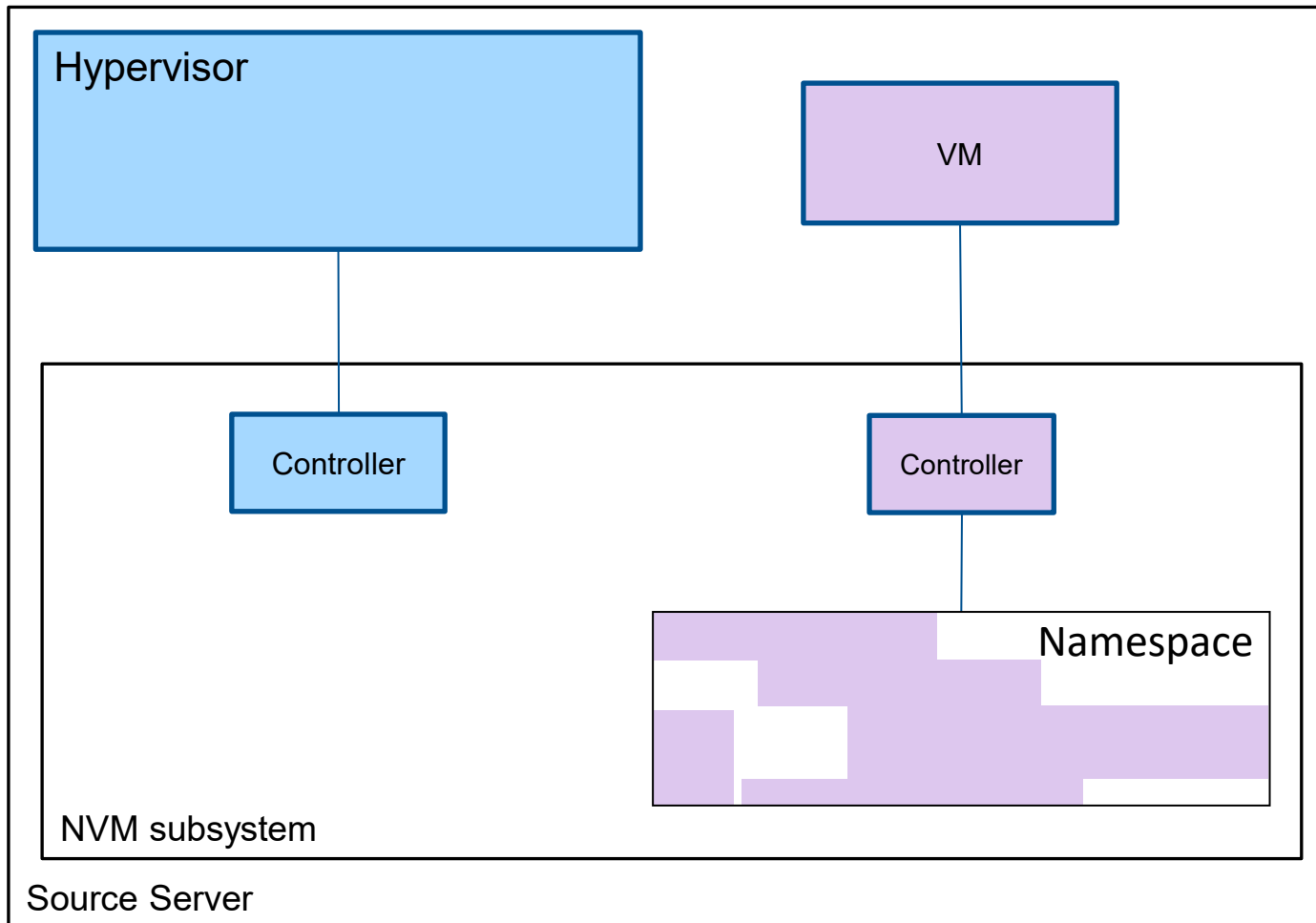
- Source NVM Subsystem
 - Read allocated logical blocks
 - Request logging changes
 - Logical Blocks
 - For the use case of migrating PCIe SSD namespaces to another PCIe SSDs

NVMe™ Host Managed Live Migration



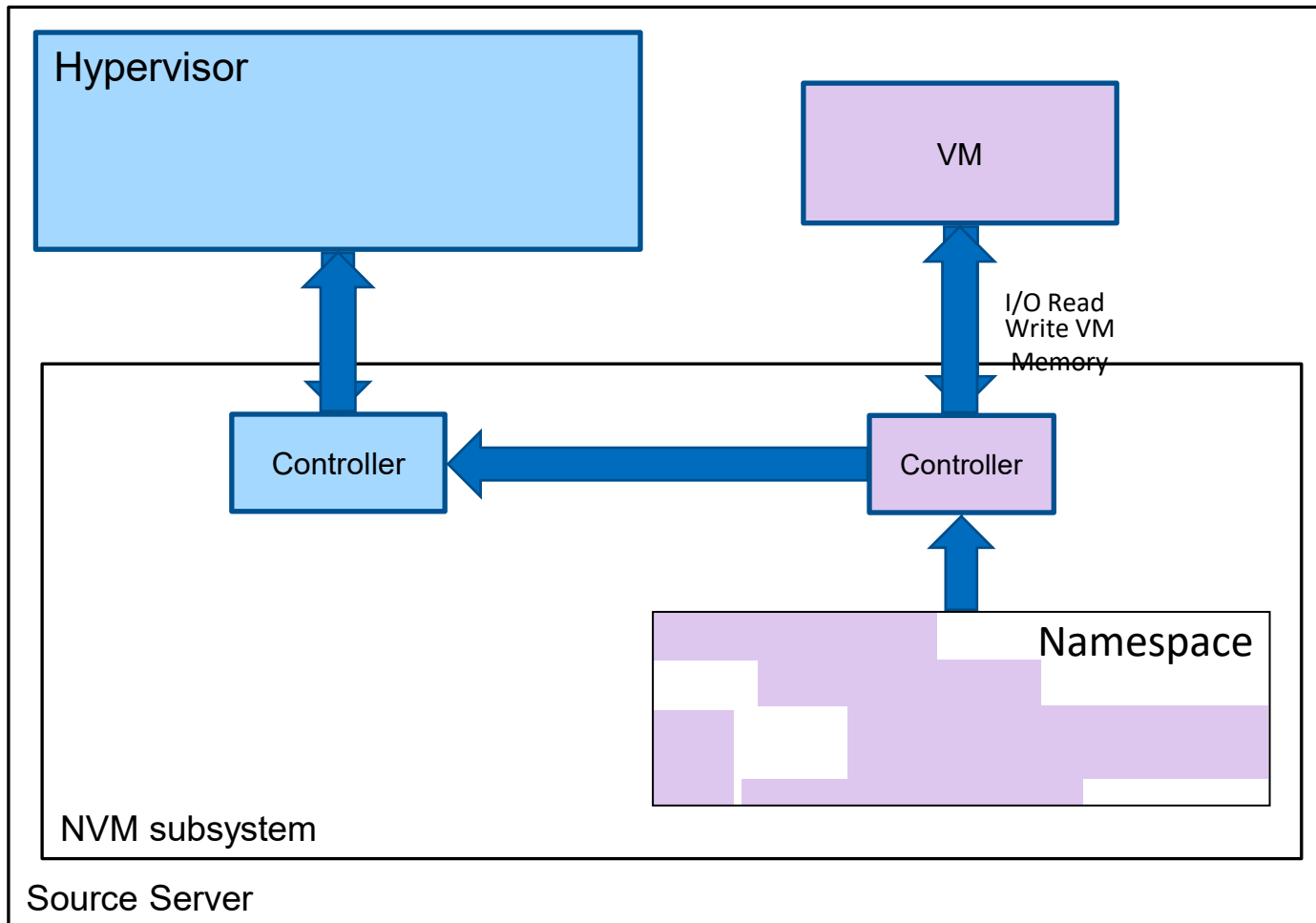
- Source NVM Subsystem
 - Read allocated logical blocks
 - Request logging changes
 - Logical Blocks
 - Create a Migration Queue
 - Start Logging
 - Post logical block changes
 - Update the Head pointer

NVMe™ Host Managed Live Migration



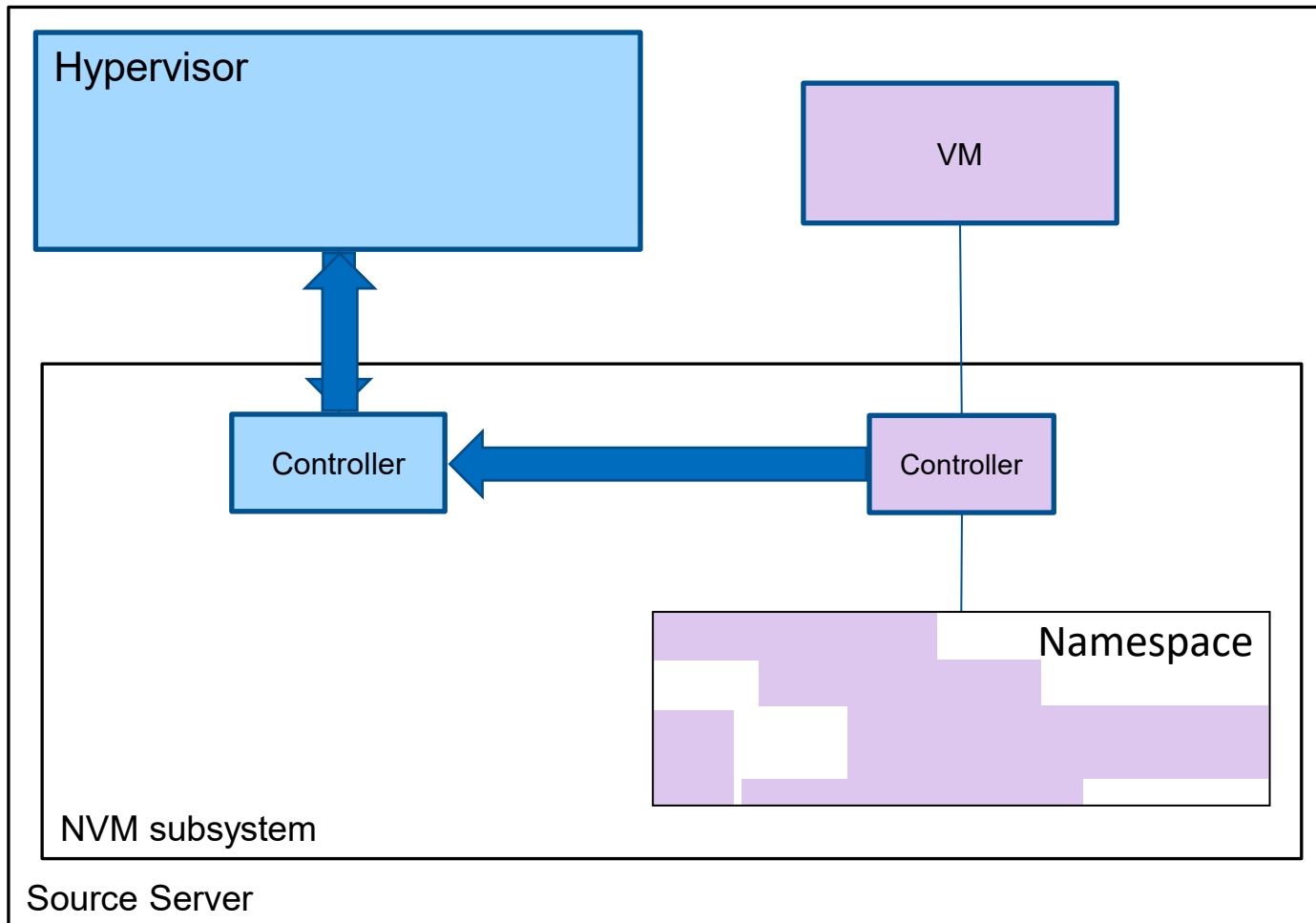
- Source NVM Subsystem
 - Read allocated logical blocks
 - Request logging changes
 - Logical Blocks
 - VM memory
 - Use case for migrating DPU controllers using NVMe-oF

NVMe™ Host Managed Live Migration



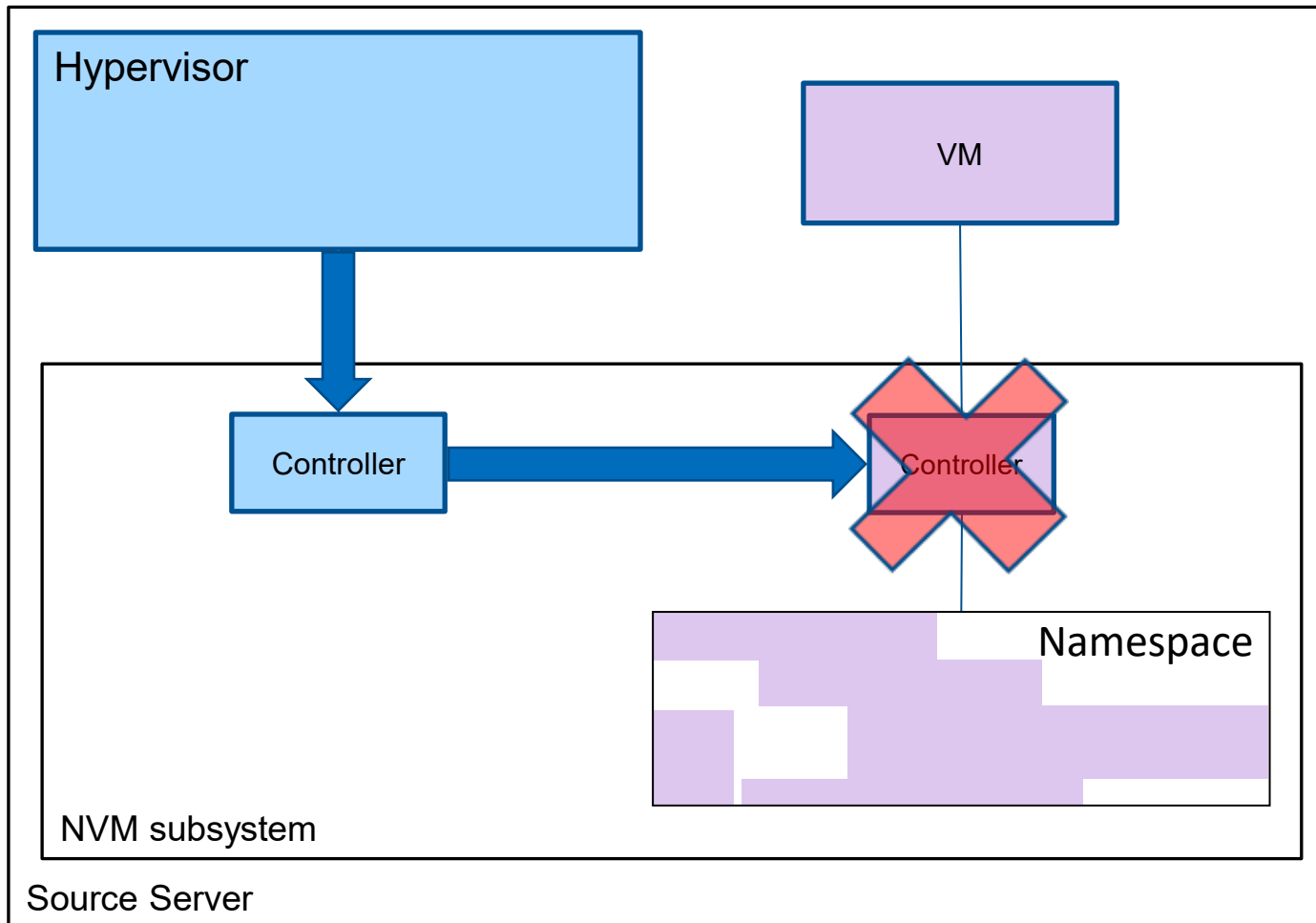
- Source NVM Subsystem
 - Read allocated logical blocks
 - Request logging changes
 - Logical Blocks
 - VM memory
 - Start logging and aggregating changes
 - Query aggregated changes

NVMe™ Host Managed Live Migration



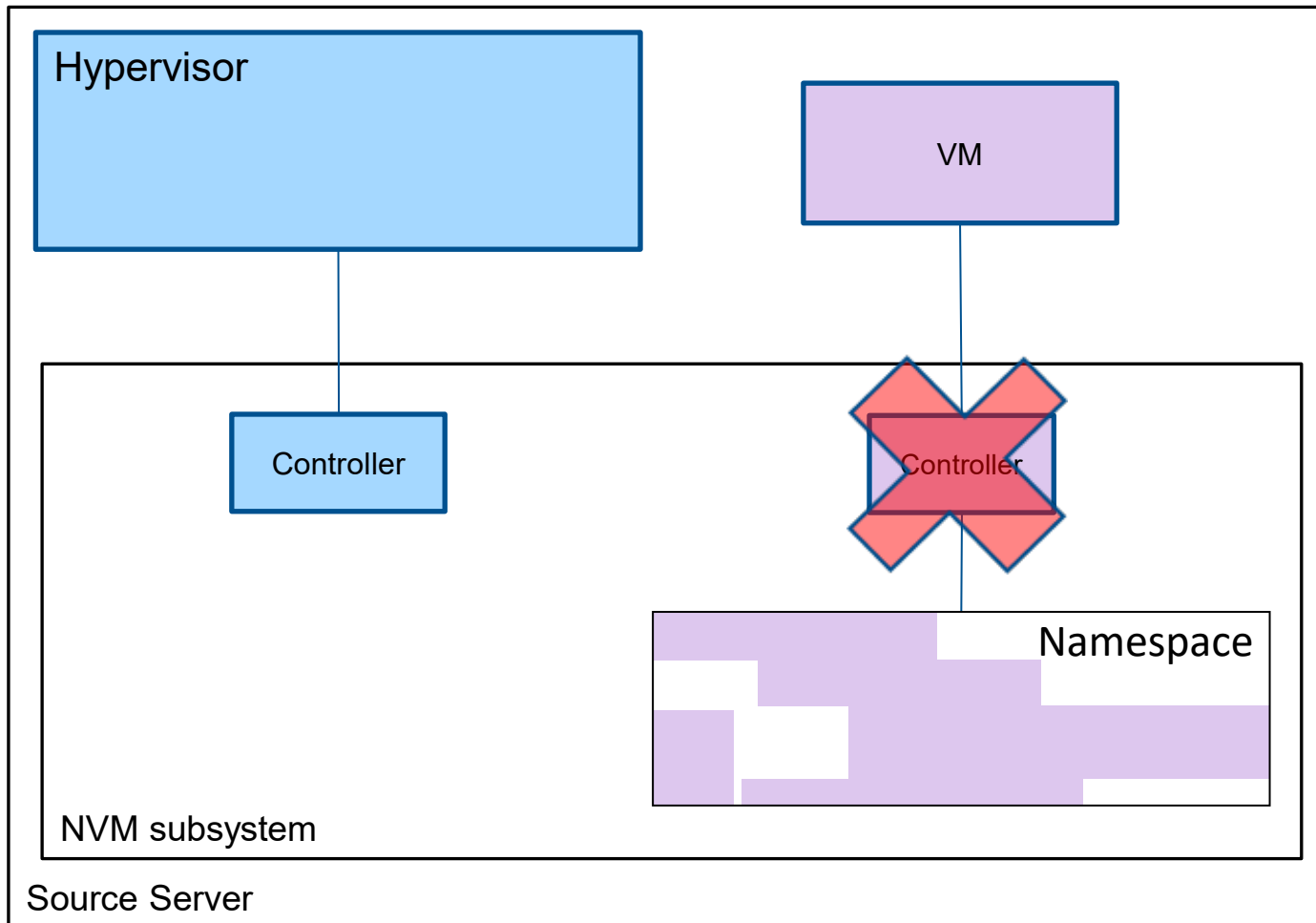
- Source NVM Subsystem
 - Read allocated logical blocks
 - Request logging changes
 - Logical Blocks
 - VM memory
 - Read controller state
 - NVMe state
 - Vendor specific state

NVMe™ Host Managed Live Migration



- Source NVM Subsystem
 - Read allocated logical blocks
 - Request logging changes
 - Logical Blocks
 - VM memory
 - Read controller state
 - Pause controller

NVMe™ Host Managed Live Migration

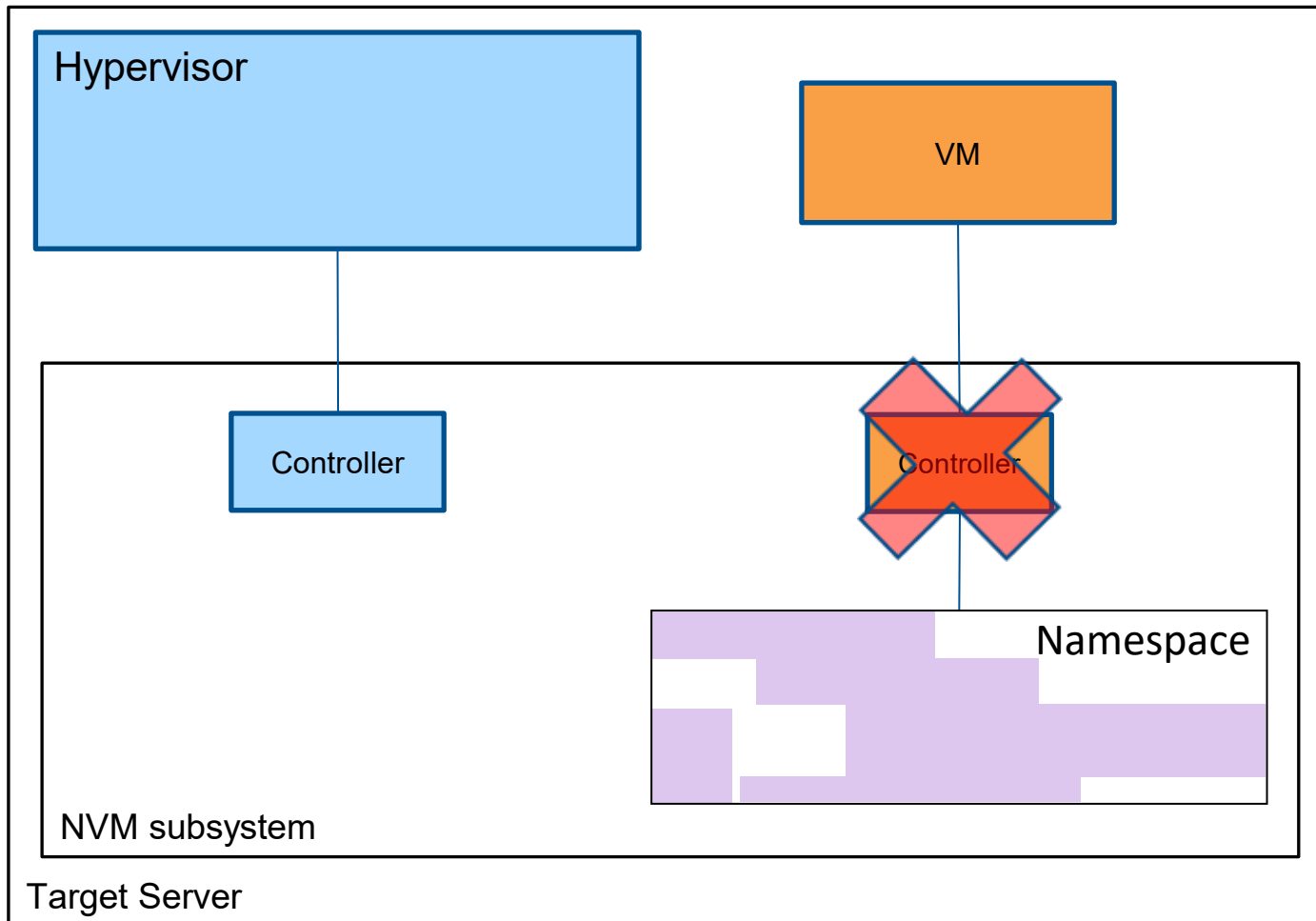


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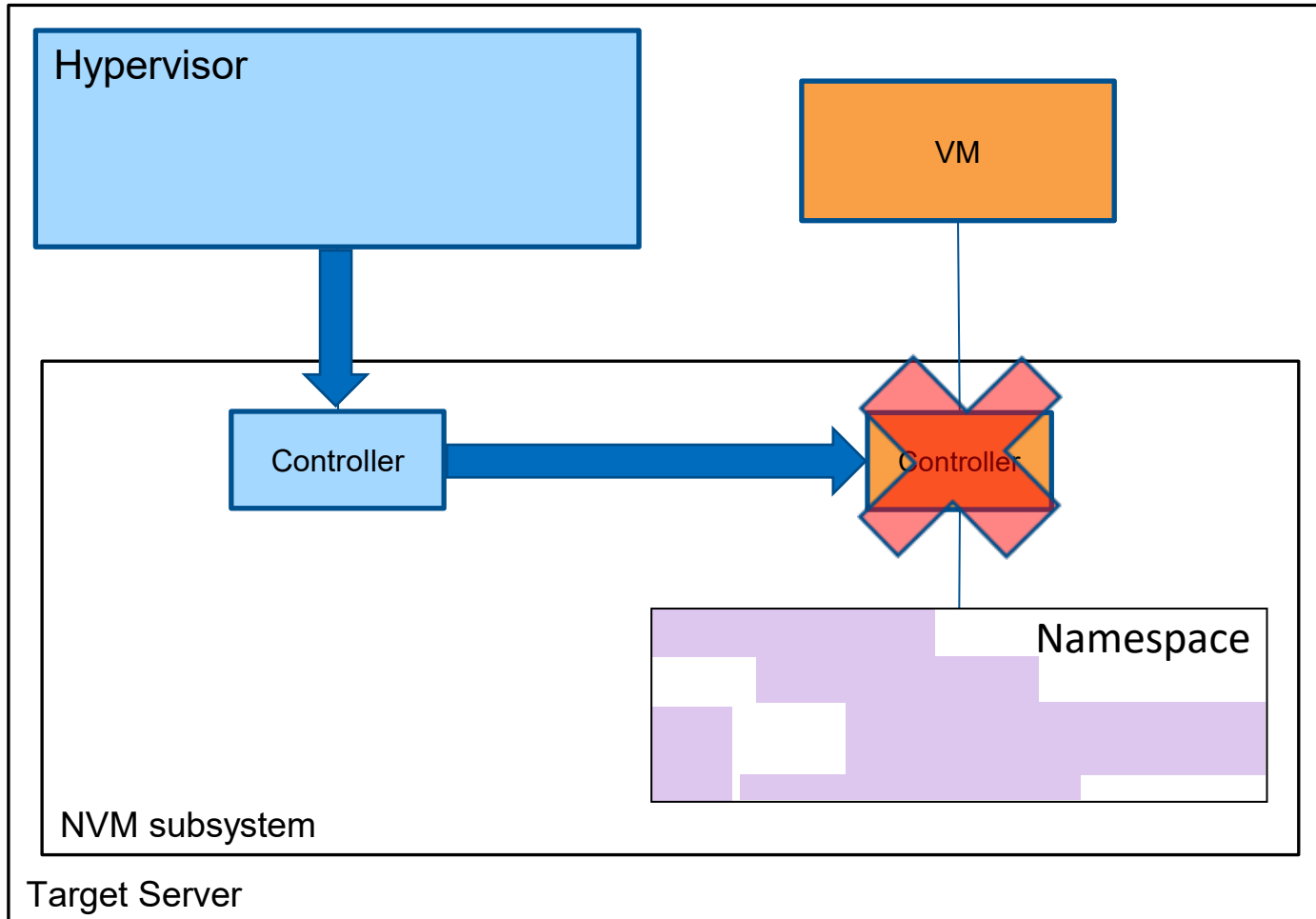
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 - Get the NVMe state from a source controller
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- Target NVM Subsystem
 - Set the Controller State

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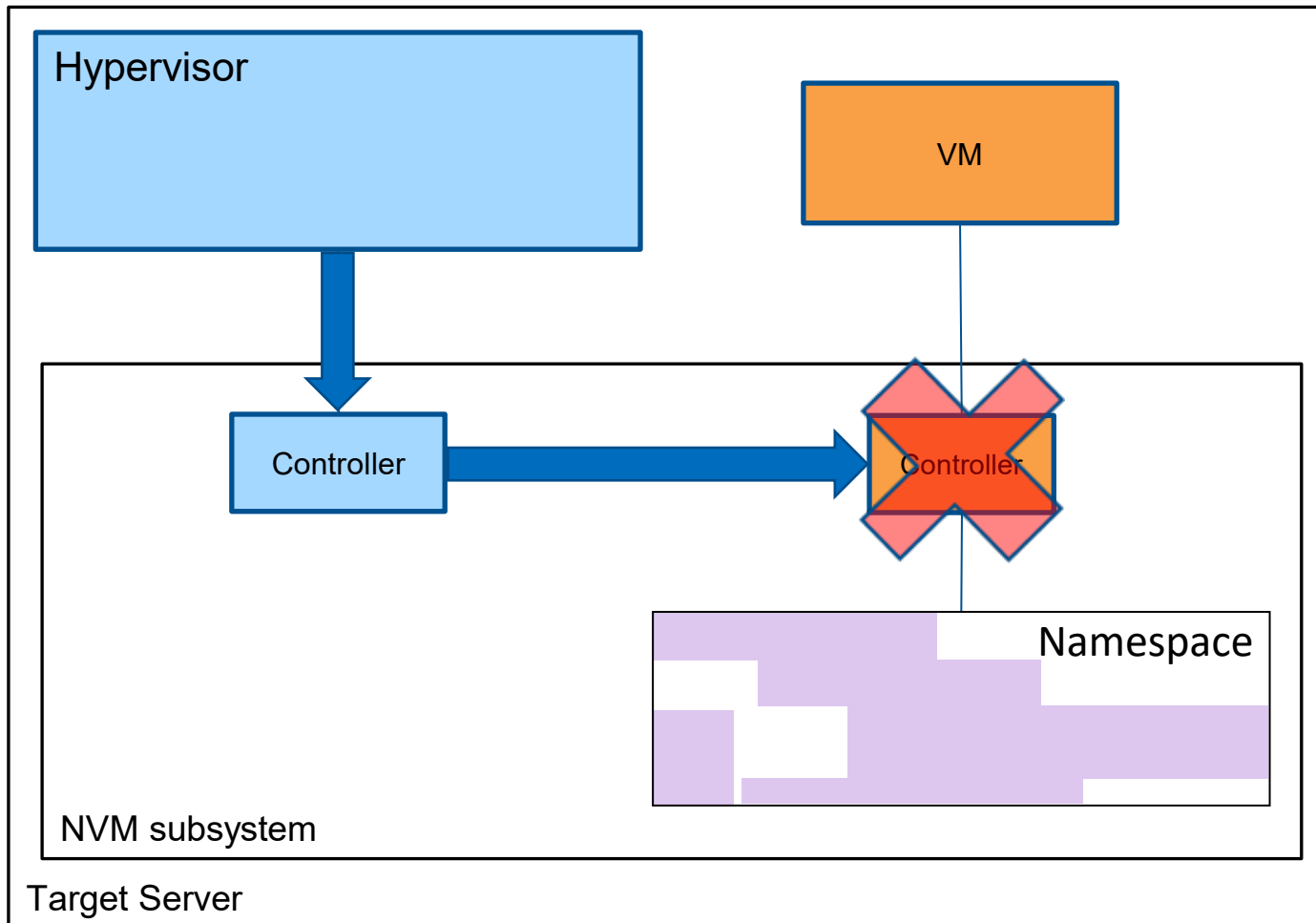
- Target NVM Subsystem
 - Set the Controller State

NVMe™ Host Managed Live Migration



- Target NVM Subsystem
 - Set the Controller State

NVMe™ Host Managed Live Migration



- Target NVM Subsystem
 - Set the Controller State
 - Resume operations on the migrated controller

NVMe™ Host Managed Live Migration

- The reading and writing of namespaces is using existing read and write I/O commands.
- The transfer of namespaces and controller state is outside the scope of the specification.

SNIA Developers Conference 2024

- I am planning on submitting a presentation for SNAI SDC 2024 to present the ratified version of the specification detailing the full NVMe™ protocol supporting Host Managed Live Migration.

THANK YOU

Please take a moment to rate this session.