AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

CMP335-R2

AWS Nitro System: Future-proofing your workloads

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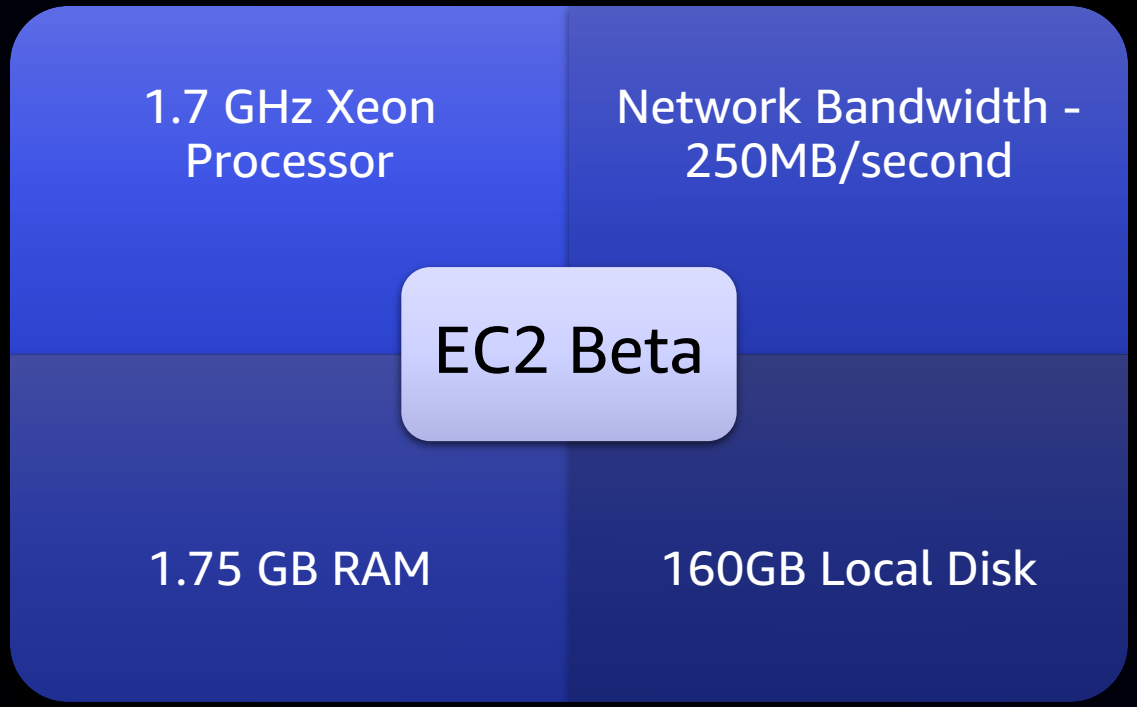
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Agenda

- A little bit of history
- Rethinking Xen virtualization
- Birth of AWS Nitro System
- Modernizing Xen instances using Nitro System
- Q&A

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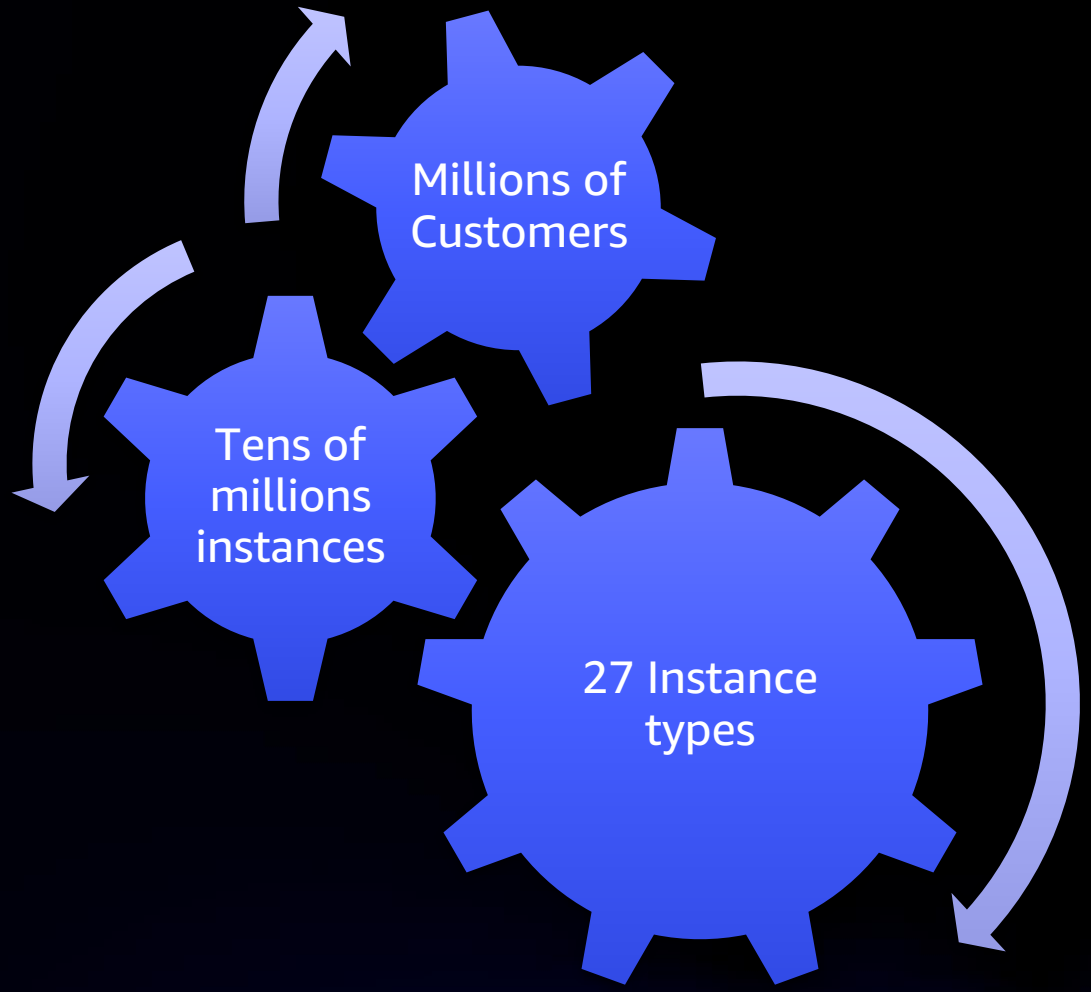
m1.small – Amazon EC2's first instance in 2006



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Xen Hypervisor

- Para-virtualized devices
- Drivers split into Frontend & Backend
- Started with no HW acceleration
- CC2, C1, M1, M2, C3, M3, R3, C4, M4, R4, T1, T2, I2, I3, X1, X1e, P2, P3, G2, G3, F1, D2, H1



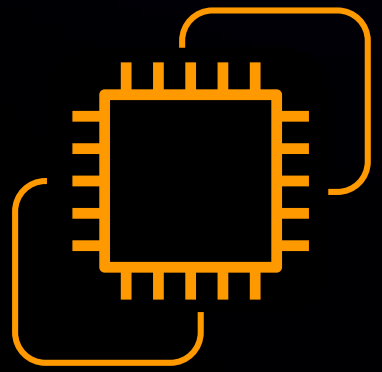
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Rethinking Xen virtualization

- Xen paravirtualization delivered “performant” VMs, but we wanted to do more for our customers
- We initiated designing a new architecture to increase performance and security
- In 2013, we released a new feature for EC2 called “enhanced networking” along with the C3 instance
- Next came the C4 instance type in 2014, offloading EBS storage into hardware
- In 2016, we released Elastic Network Adapter (ENA)

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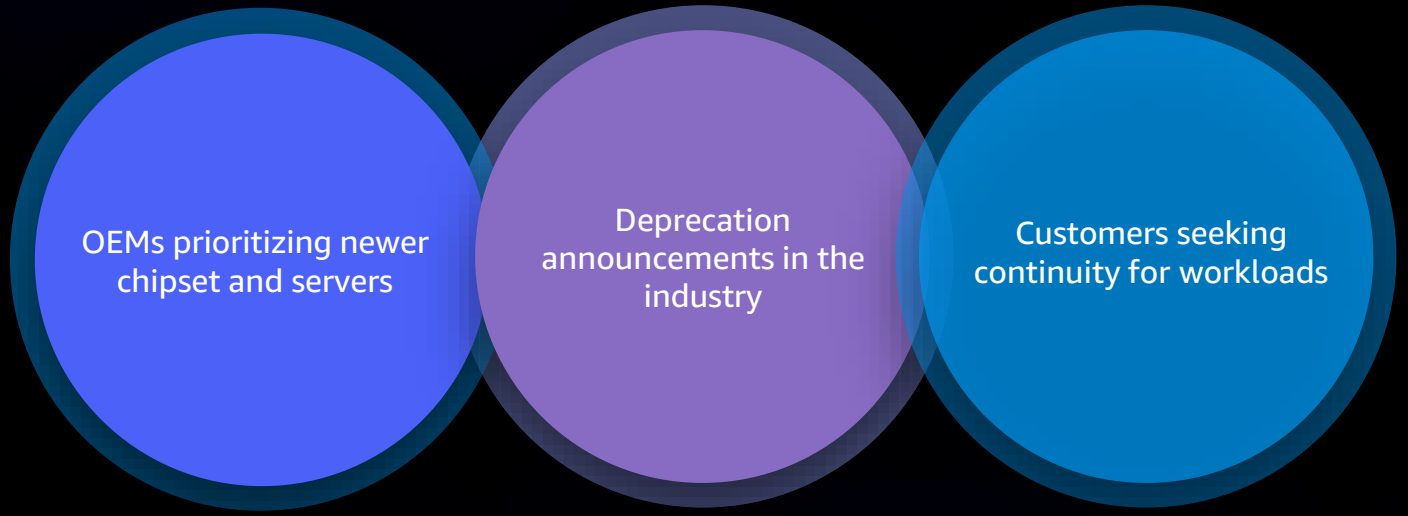
AWS Nitro System



- Launched in November 2017
- In development since 2013
- All new launches on Nitro System
- Purpose-built hardware and software
- Hypervisor built for AWS

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Can Nitro System modernize Xen instances?



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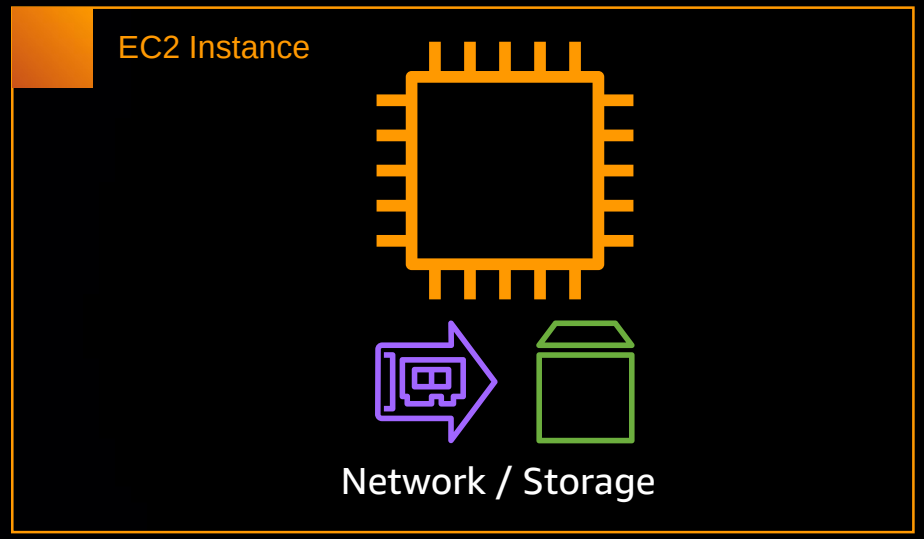
Nitro System support for previous generation instances

- Xen instances will now receive modern hardware and software components of the Nitro System
- Customers can continue running their instances beyond the lifetime of the underlying hardware
- Business continuity is maintained since no changes are required to be made to the workloads/AMIs by our customers
- Customers receive the enhanced scalability, elasticity ,and security benefits of the Nitro System
- Accelerated computing instances benefit most from running on Nitro System natively

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The Nitro System

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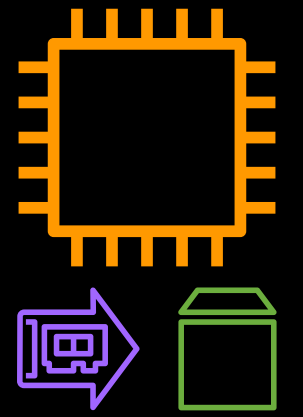


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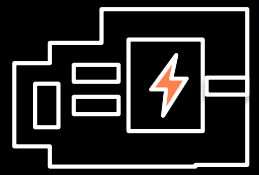
Nitro VMM

2

Nitro Instance



Network / Storage

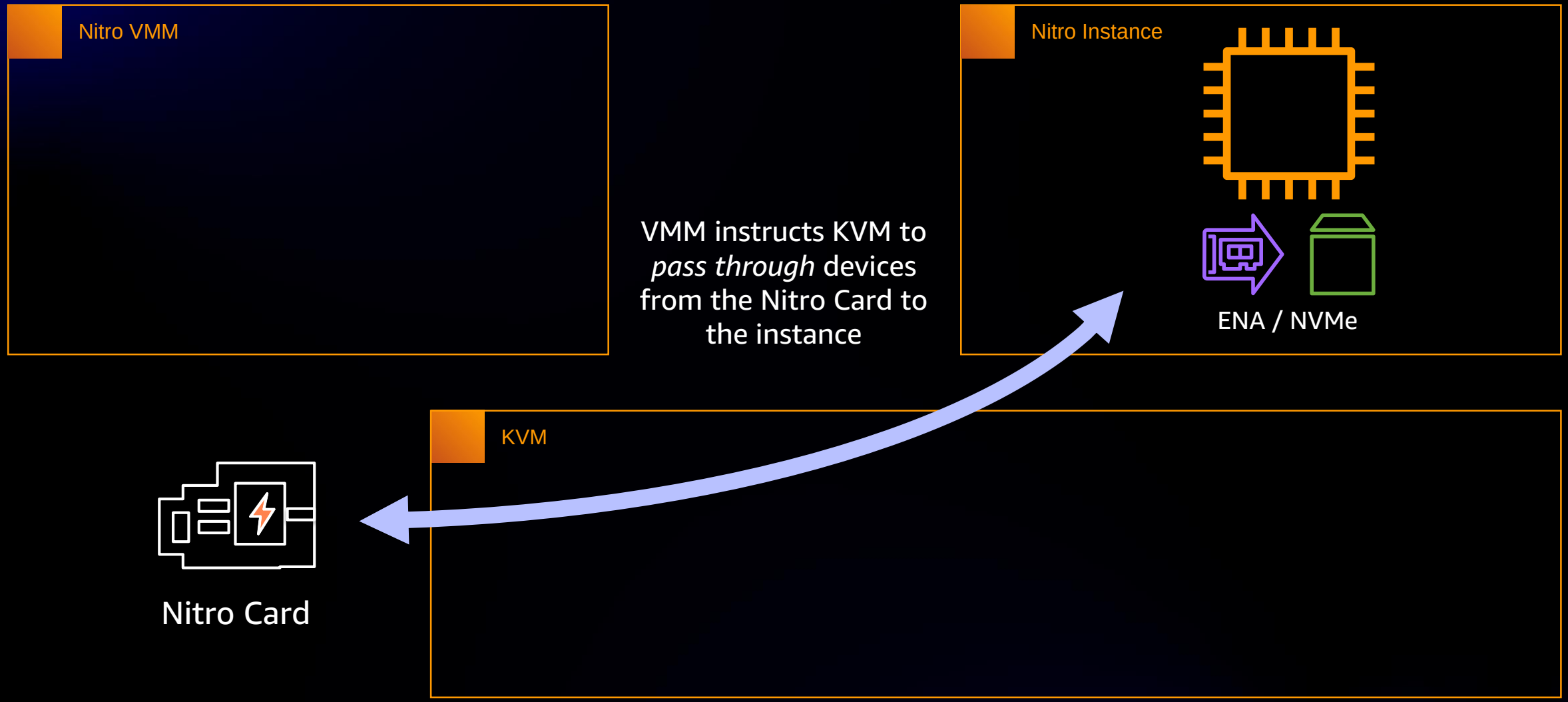


Nitro Card

KVM

1

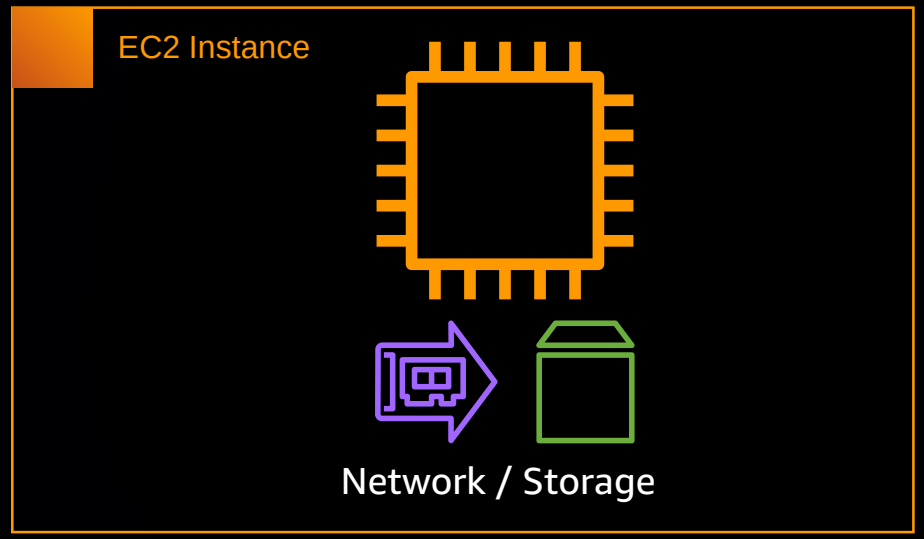
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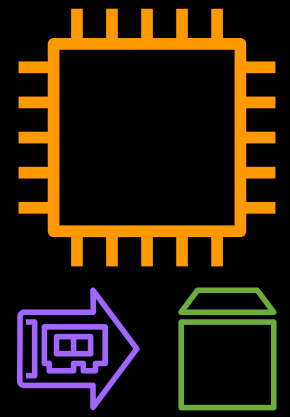
Xen Hypervisor

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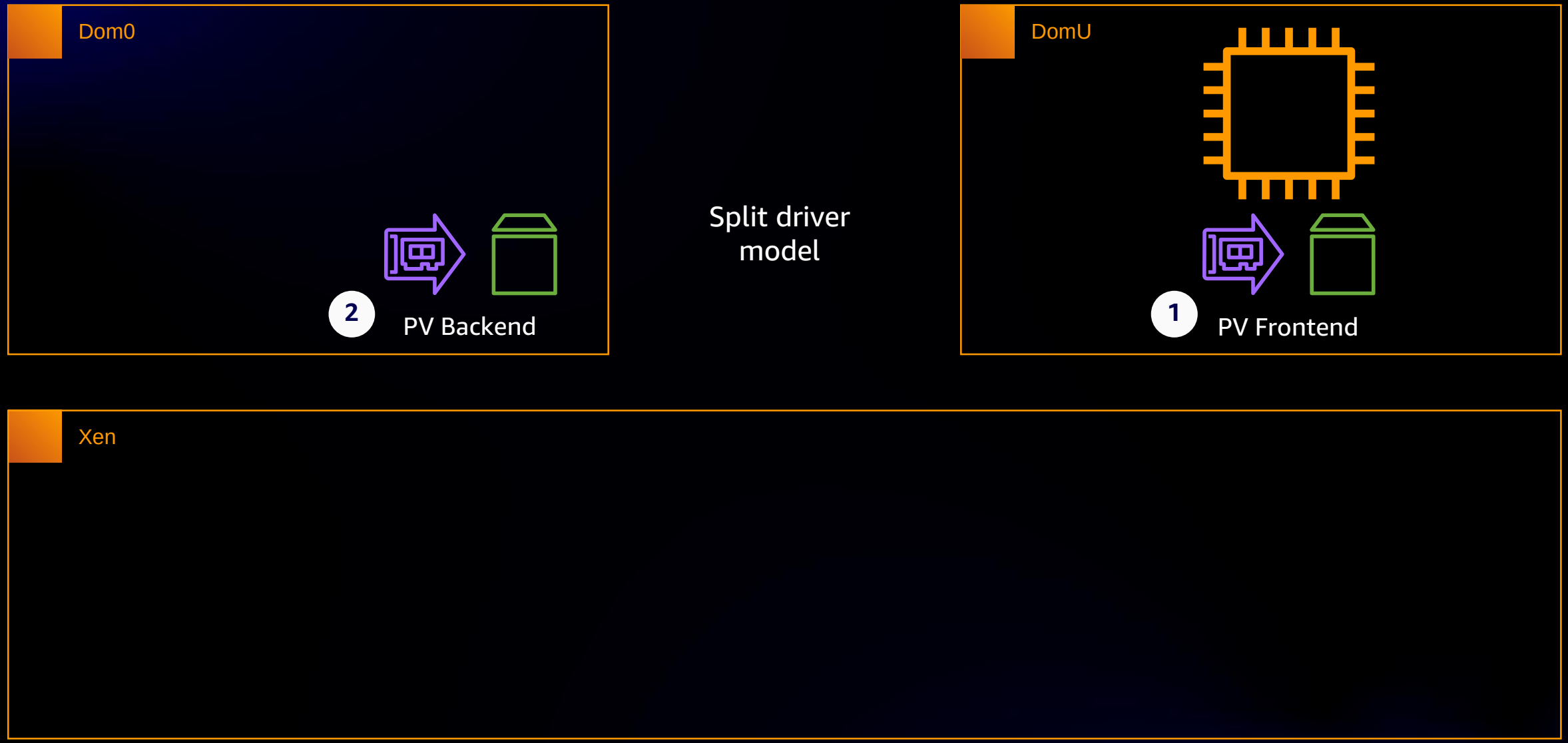
Xen Instance



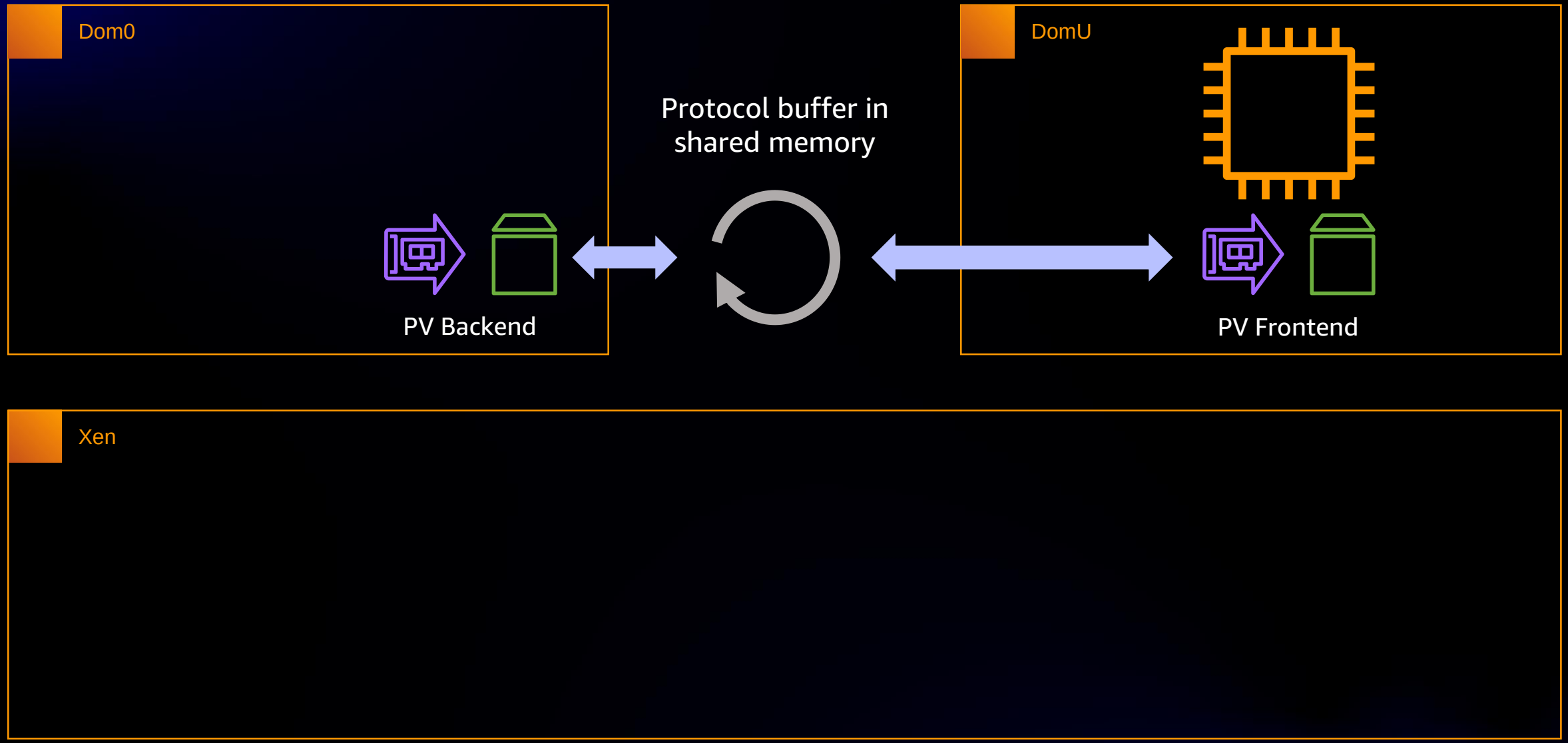
Paravirtual (PV) devices

Xen

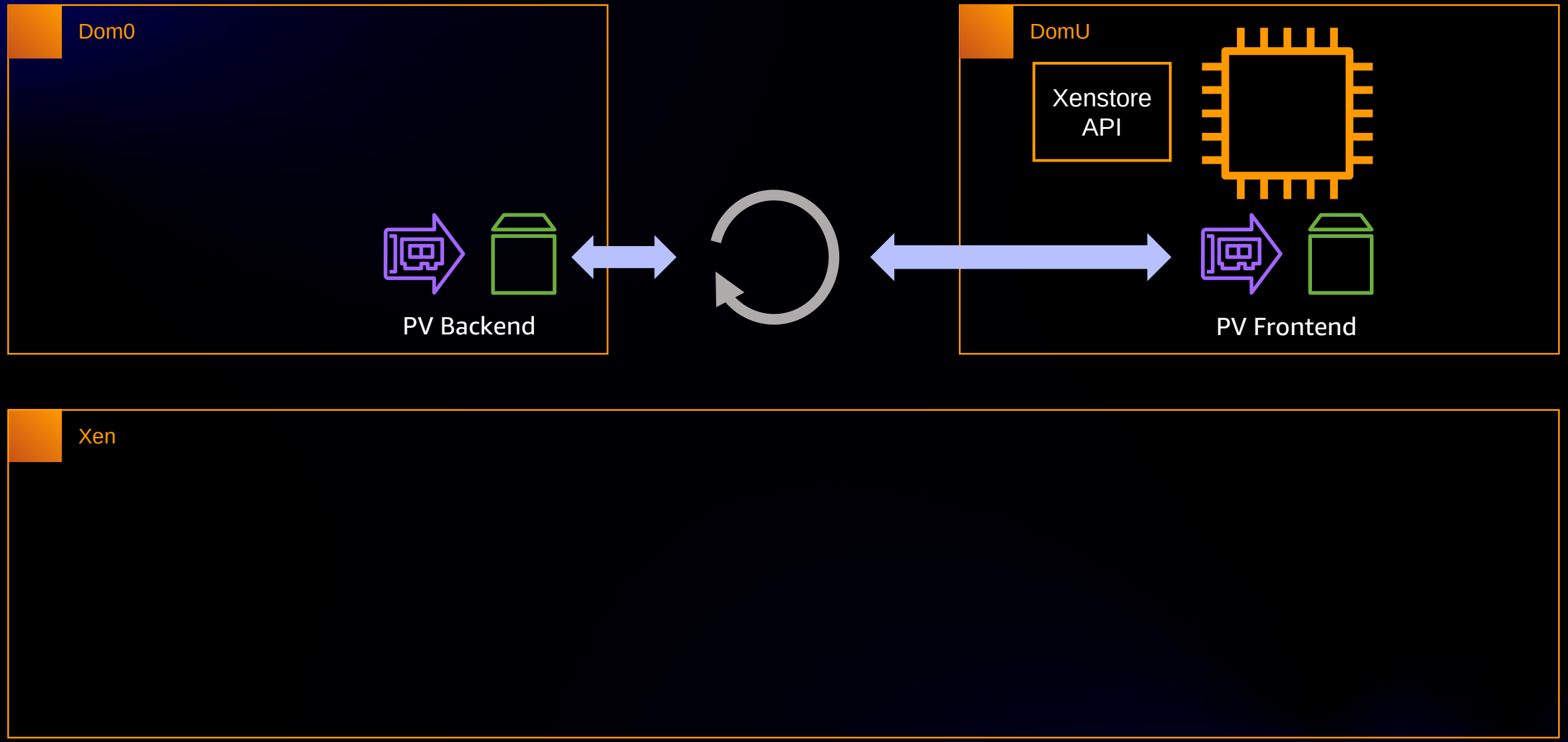
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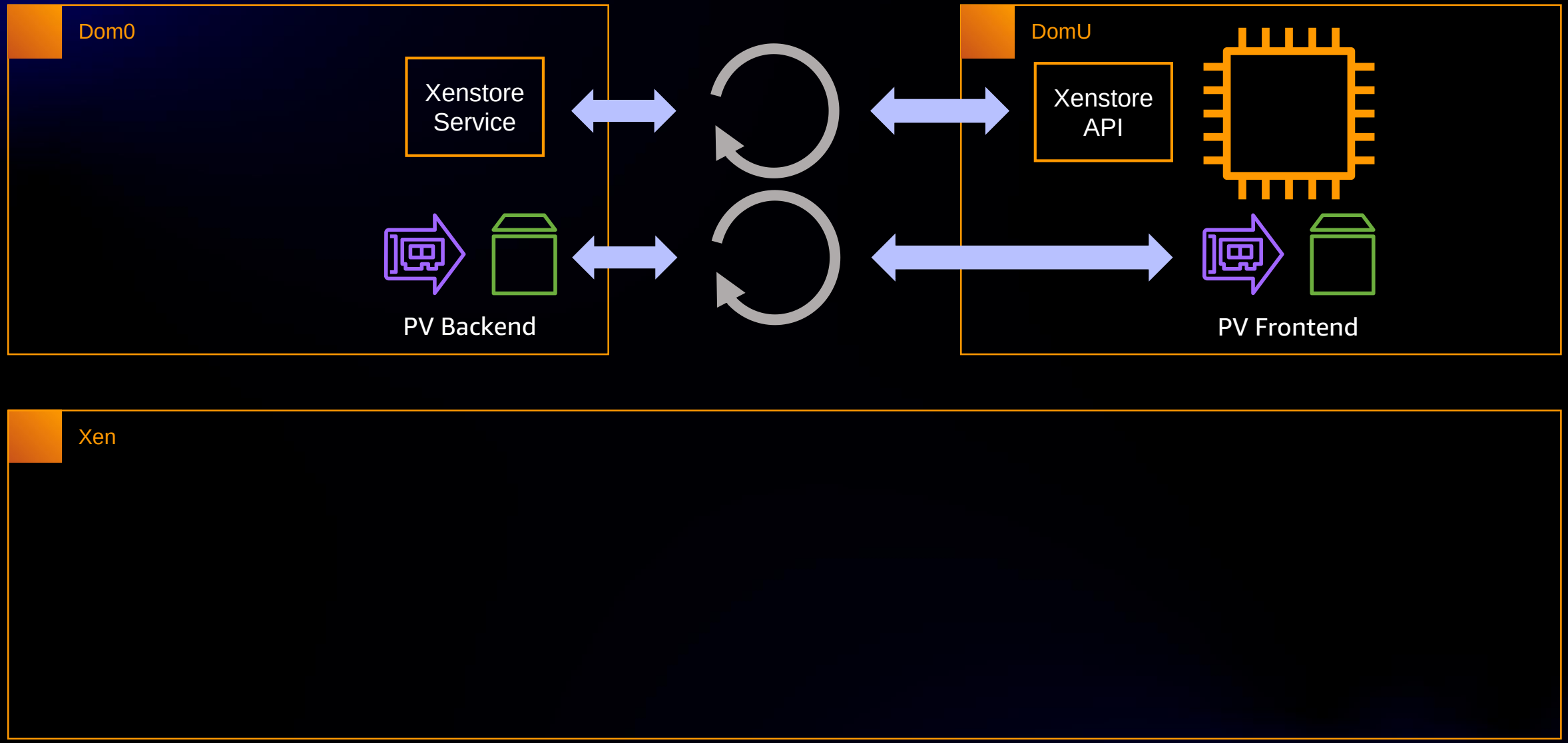
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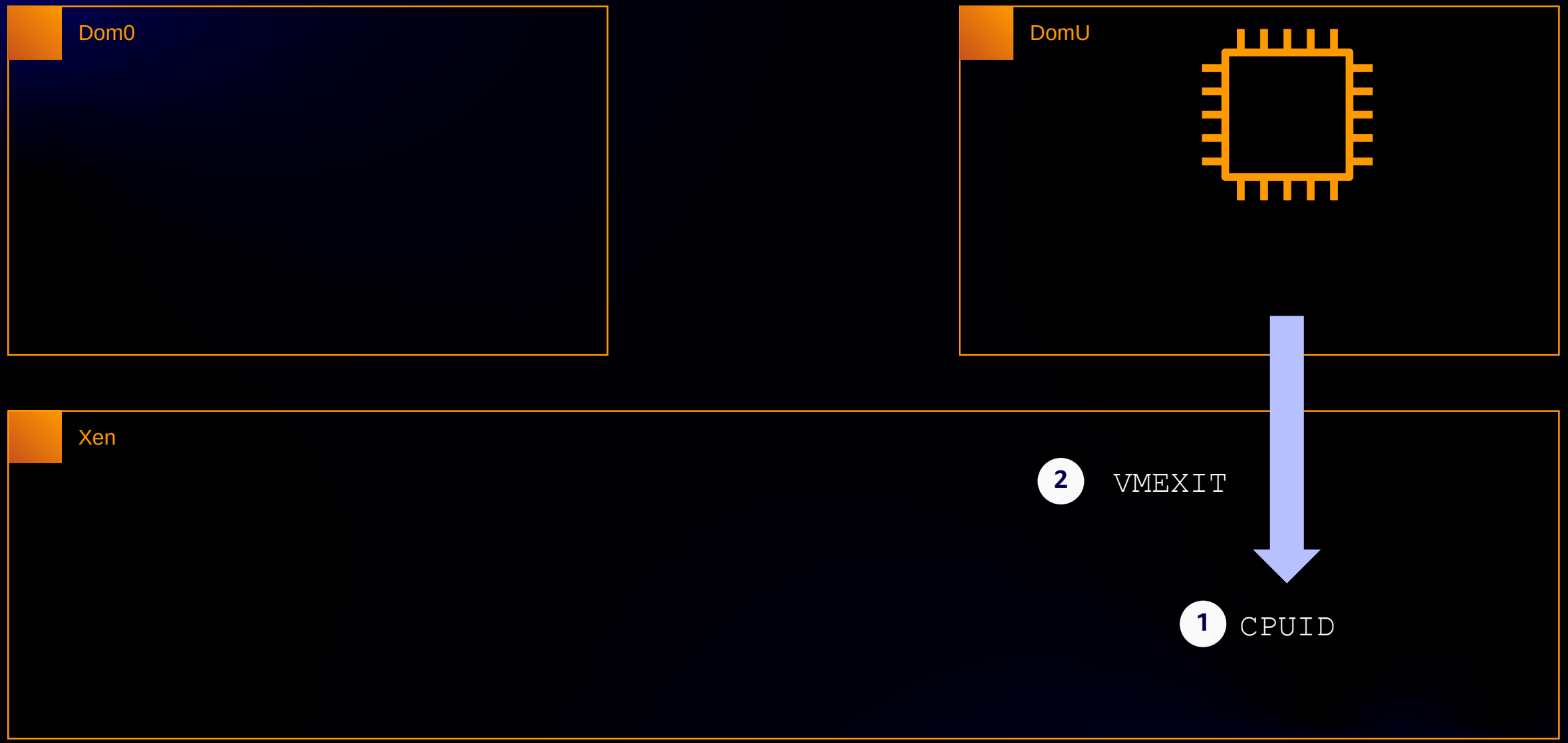
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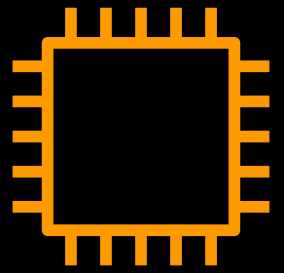
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Dom0

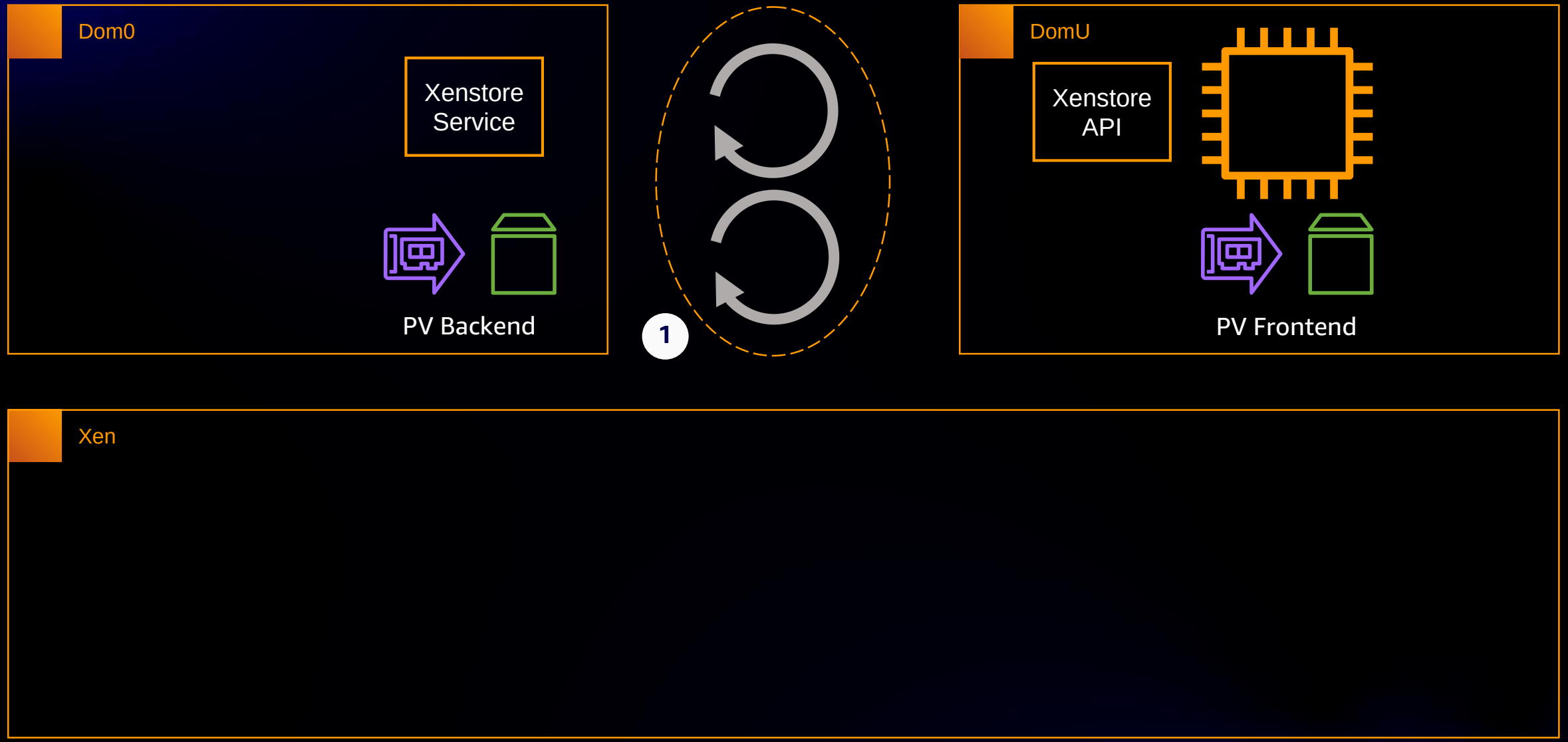
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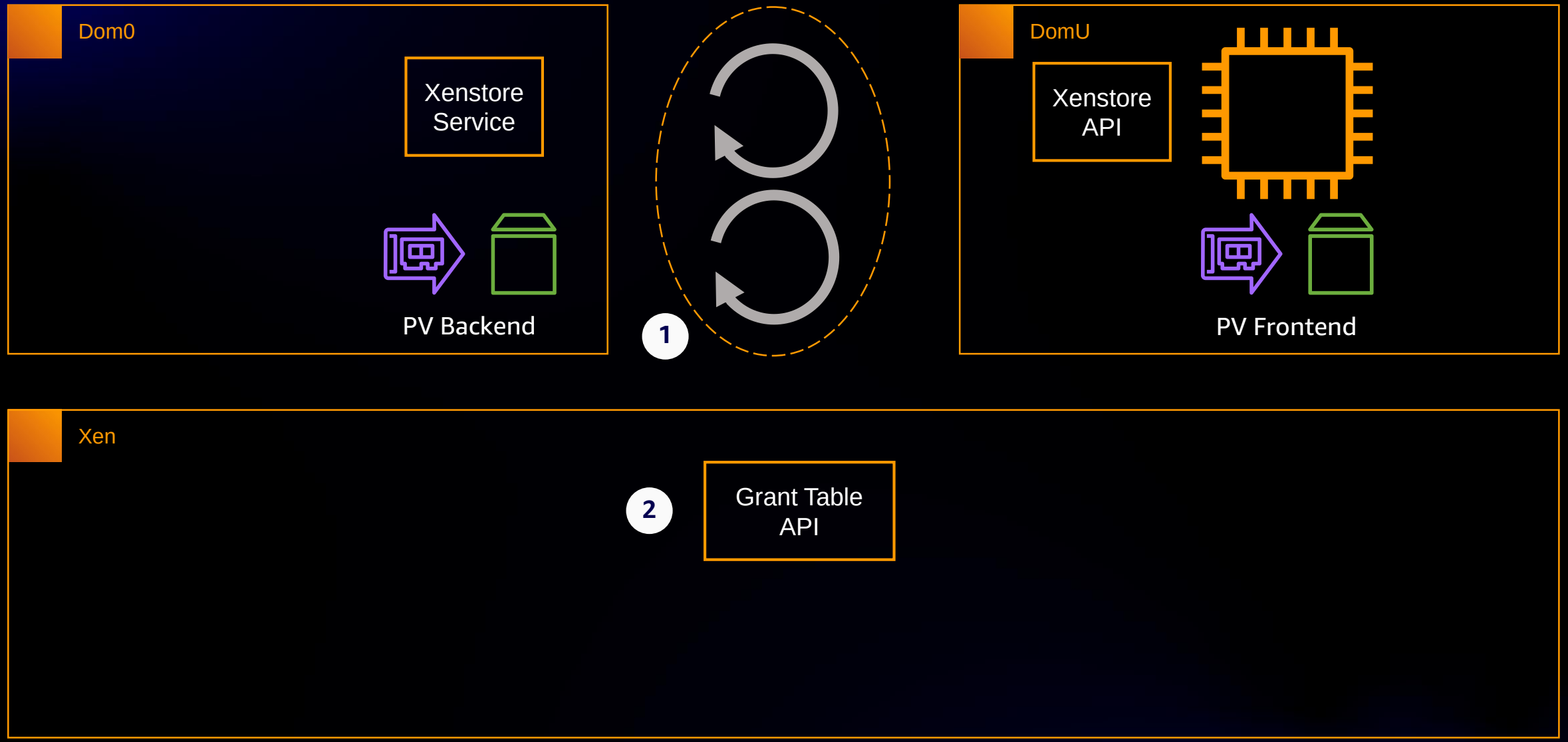
Xen

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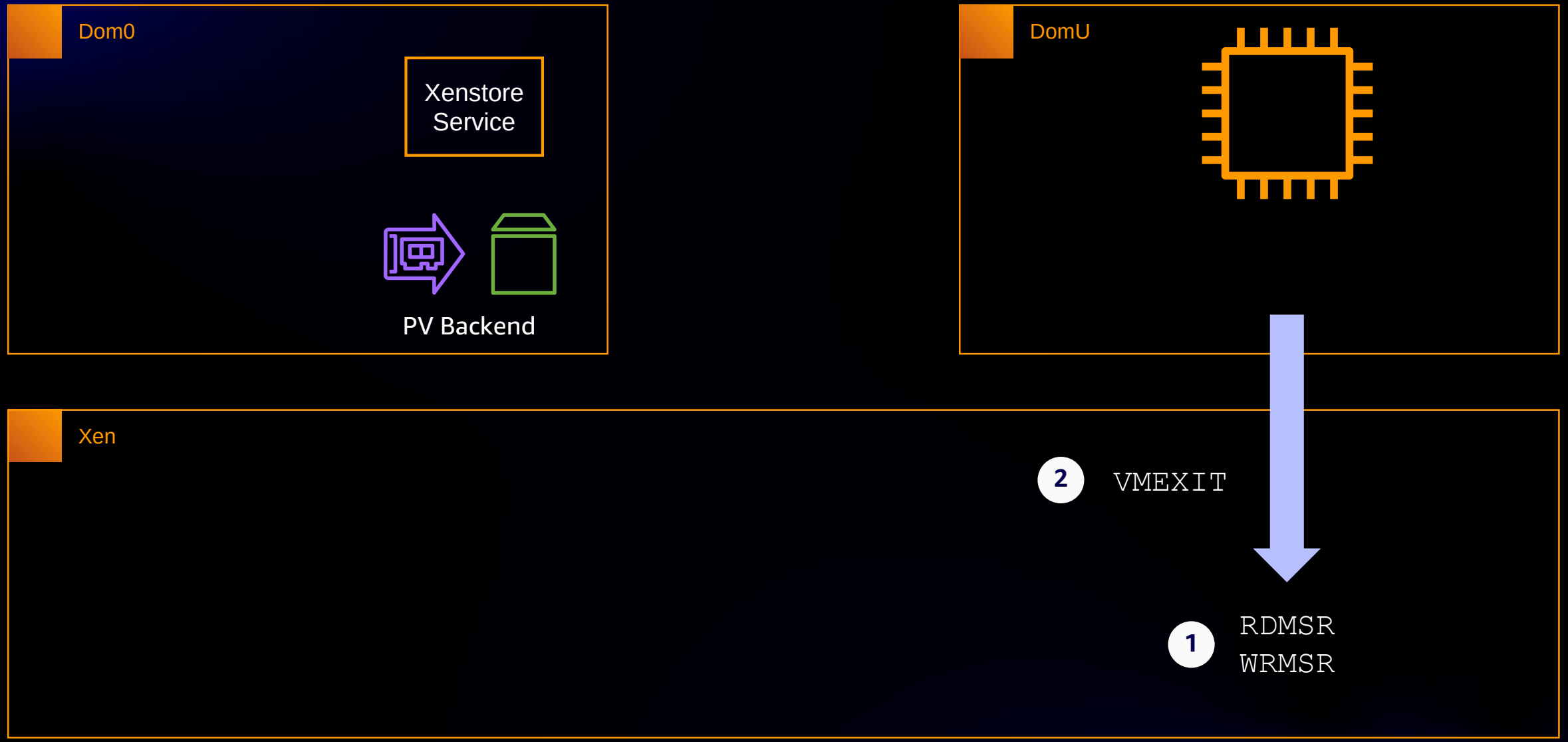
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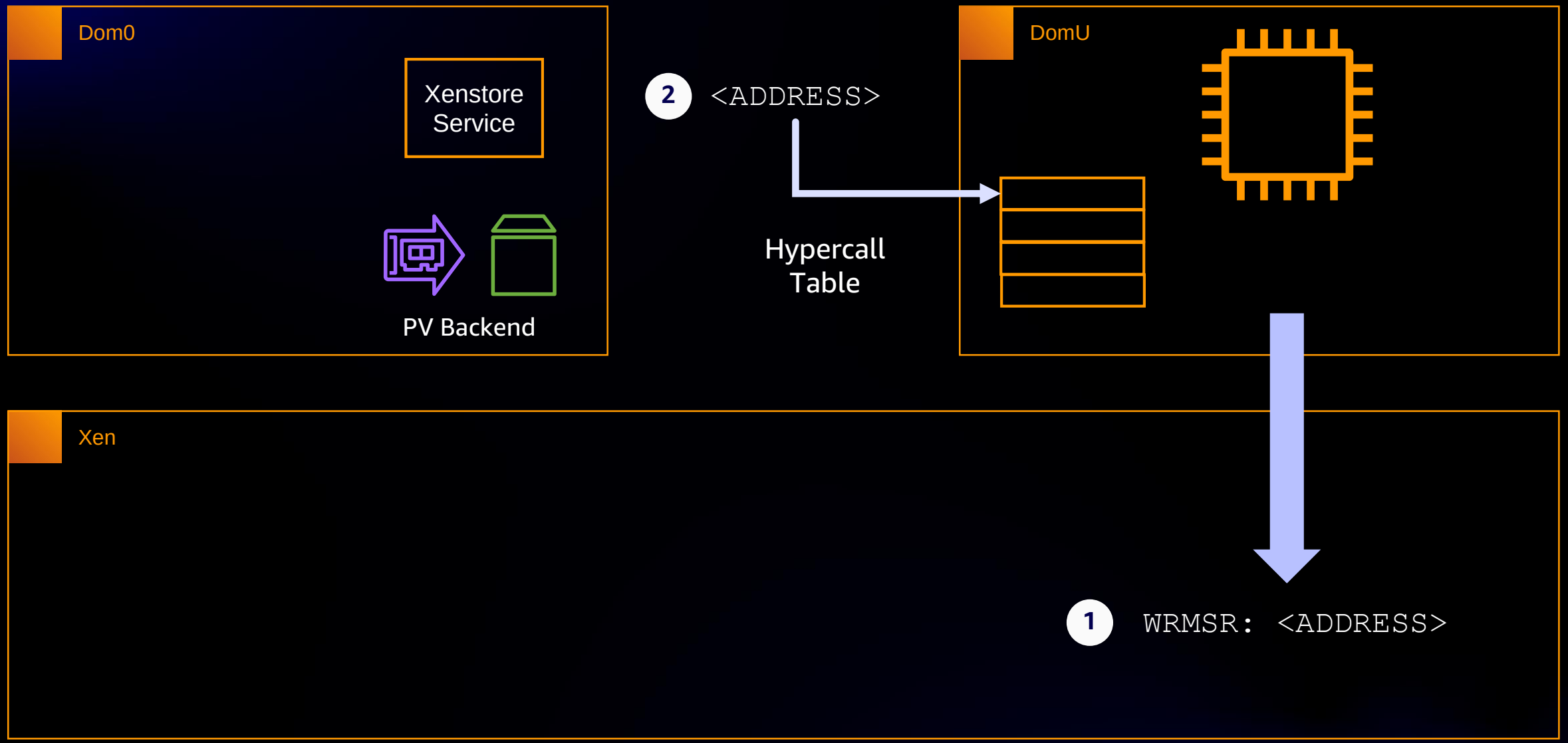
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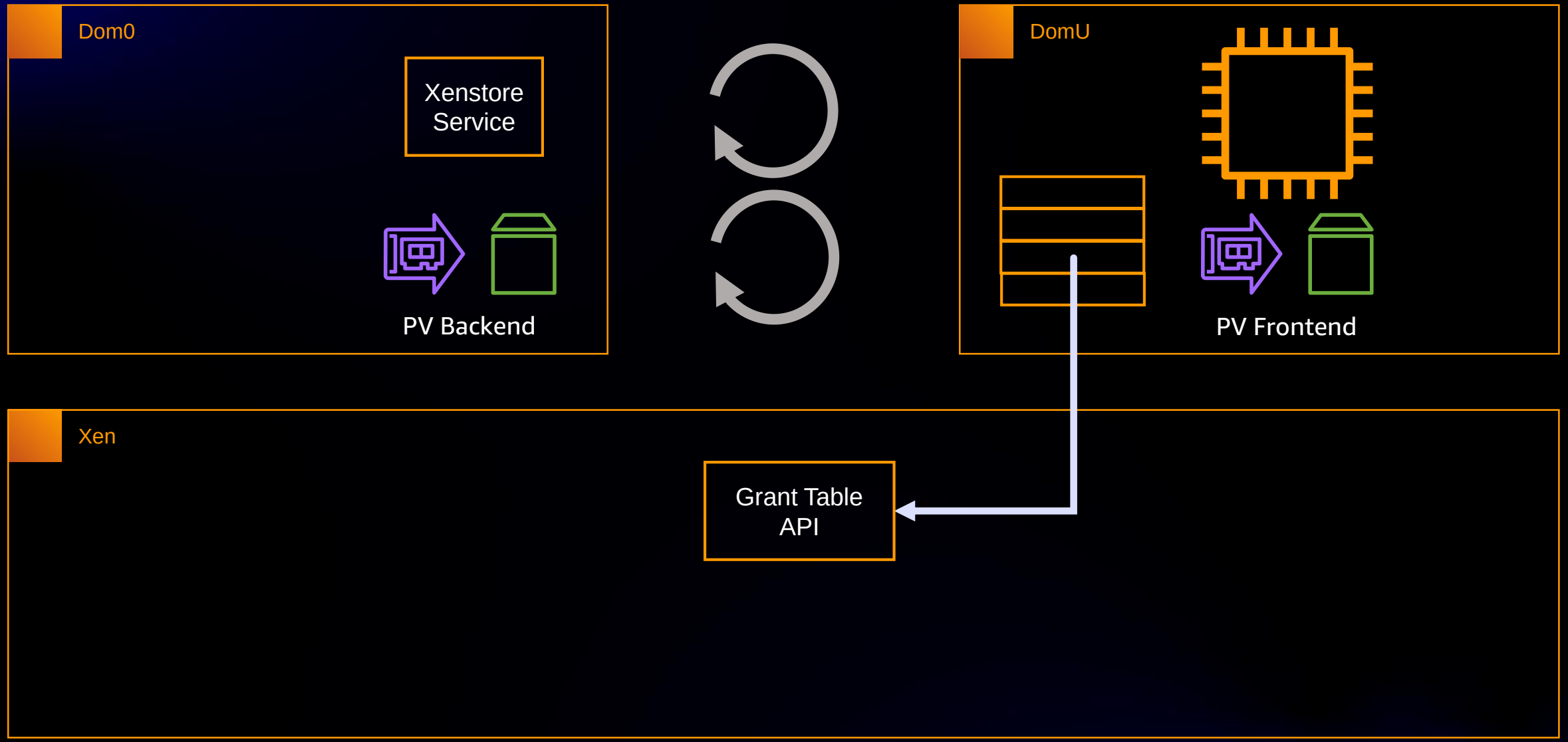
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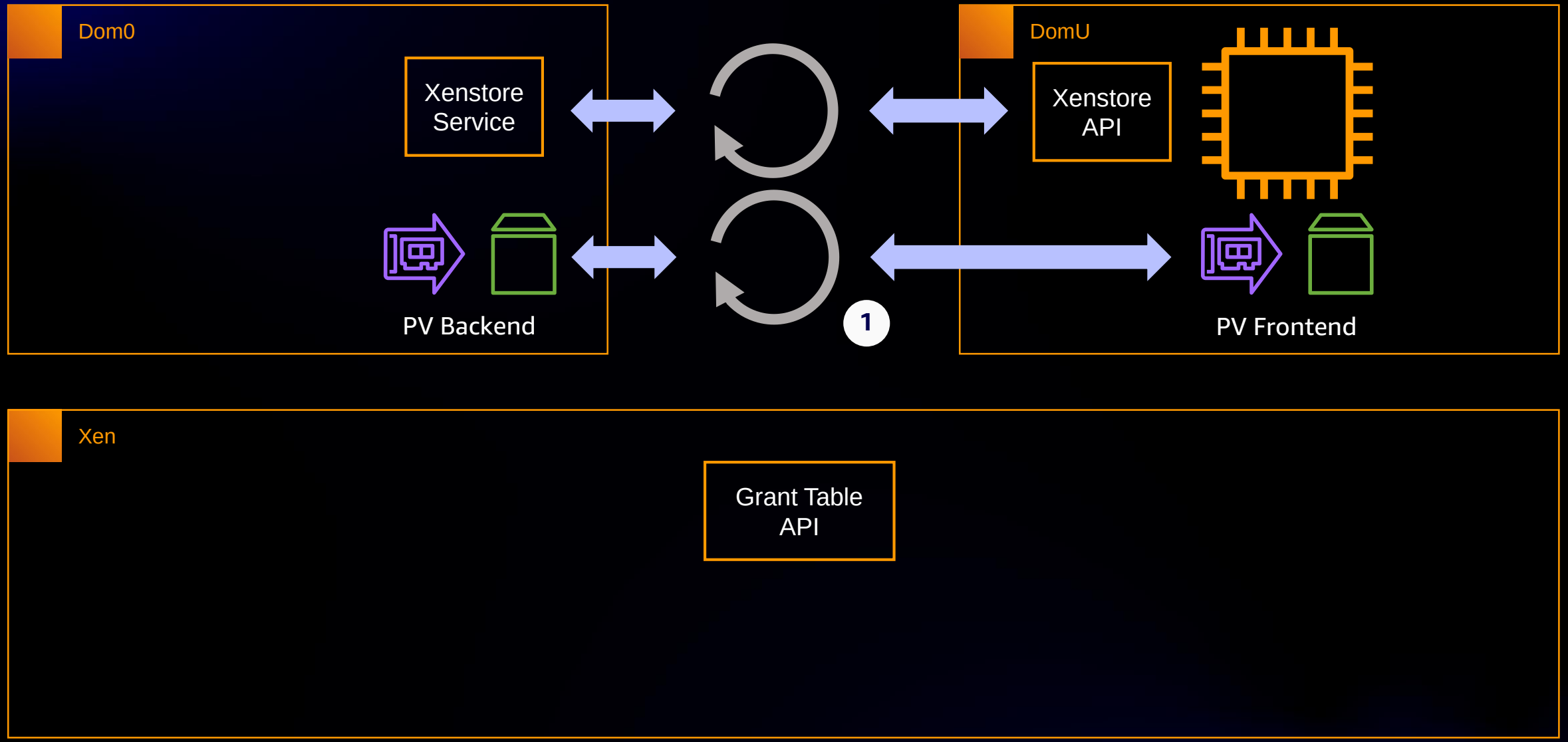
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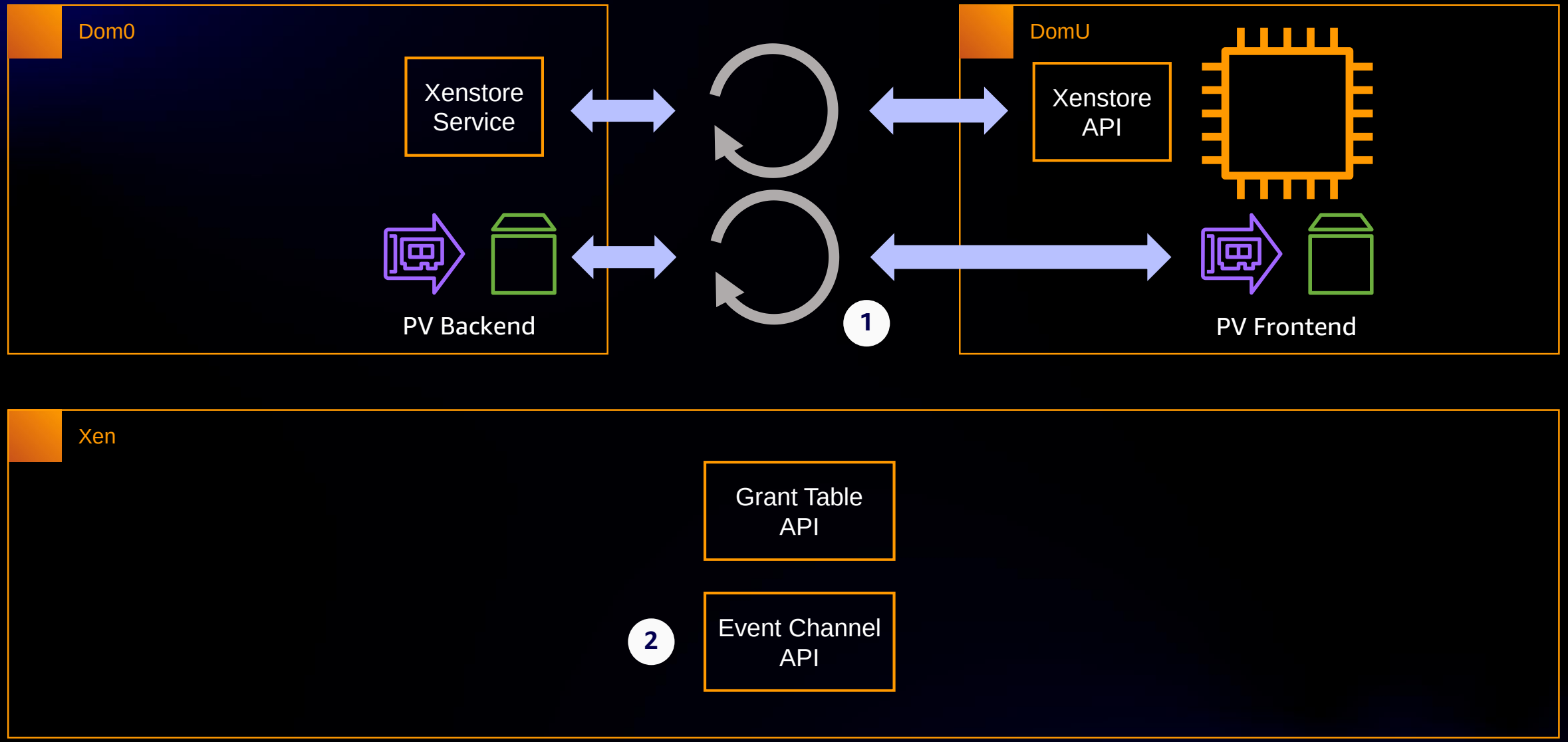
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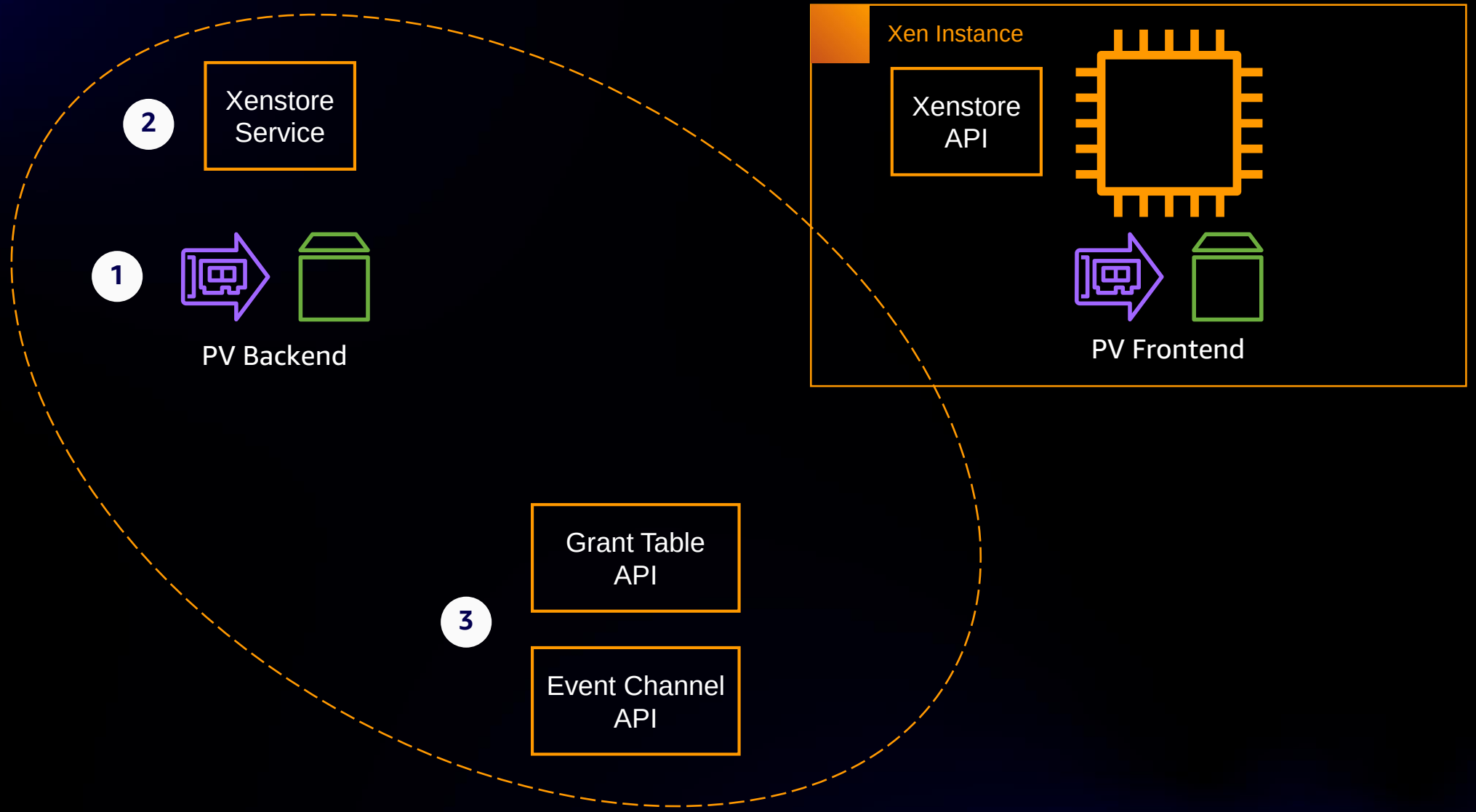
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Xen instances on the Nitro System

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Nitro VMM

Event Channel API

Grant Table API

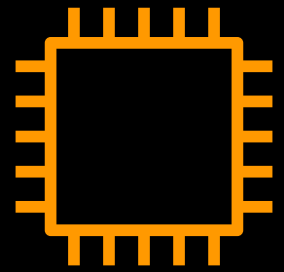
Xenstore Service



PV Backend

Xen Instance

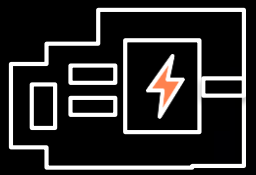
Xenstore API





PV Frontend

KVM



Nitro Card

aws

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Nitro VMM

Event Channel API

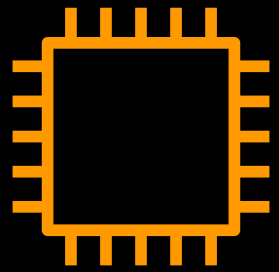
Grant Table API

Xenstore Service



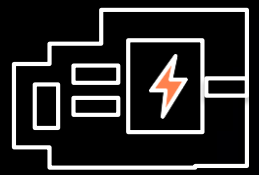
PV Backend

Xen Instance



KVM

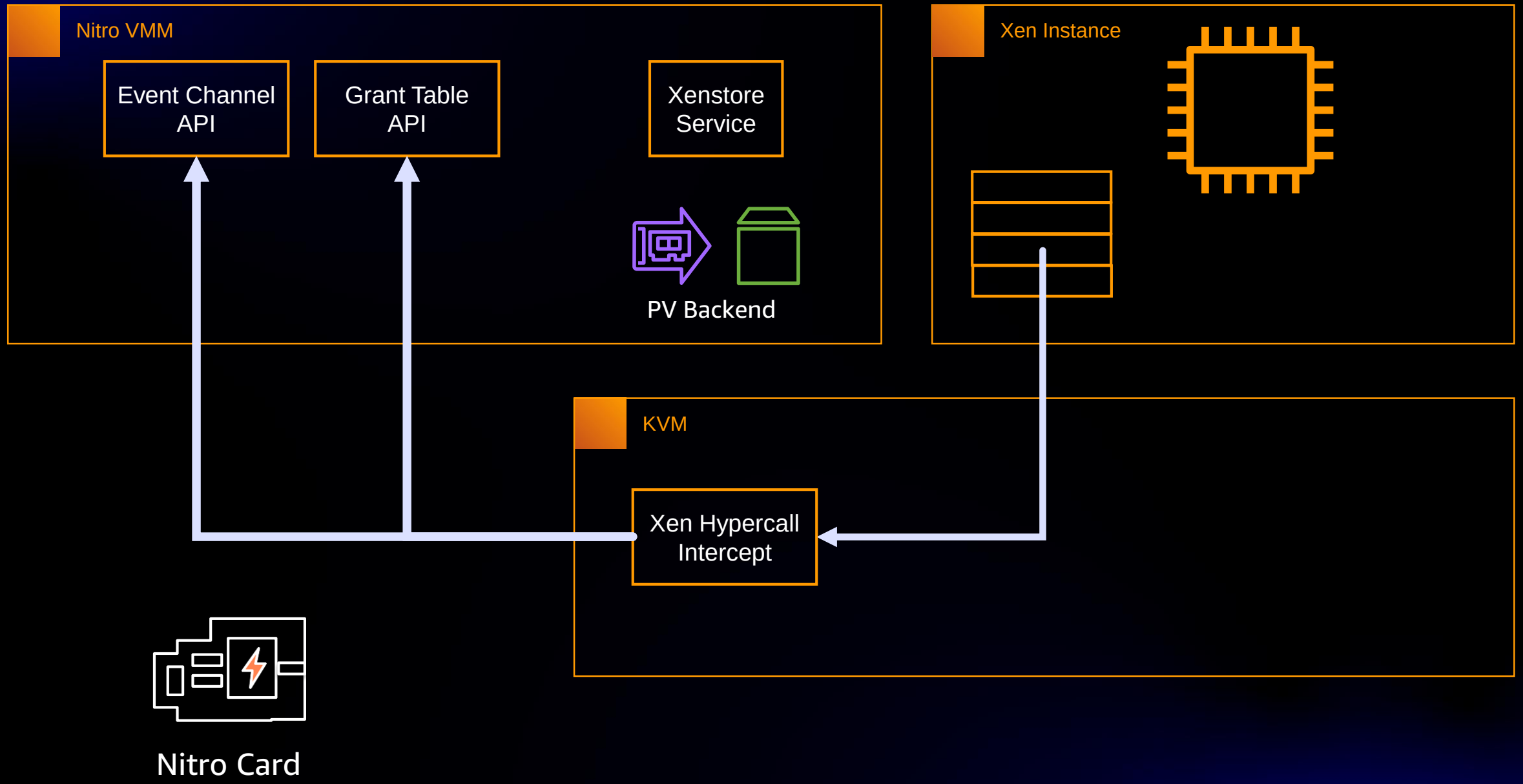
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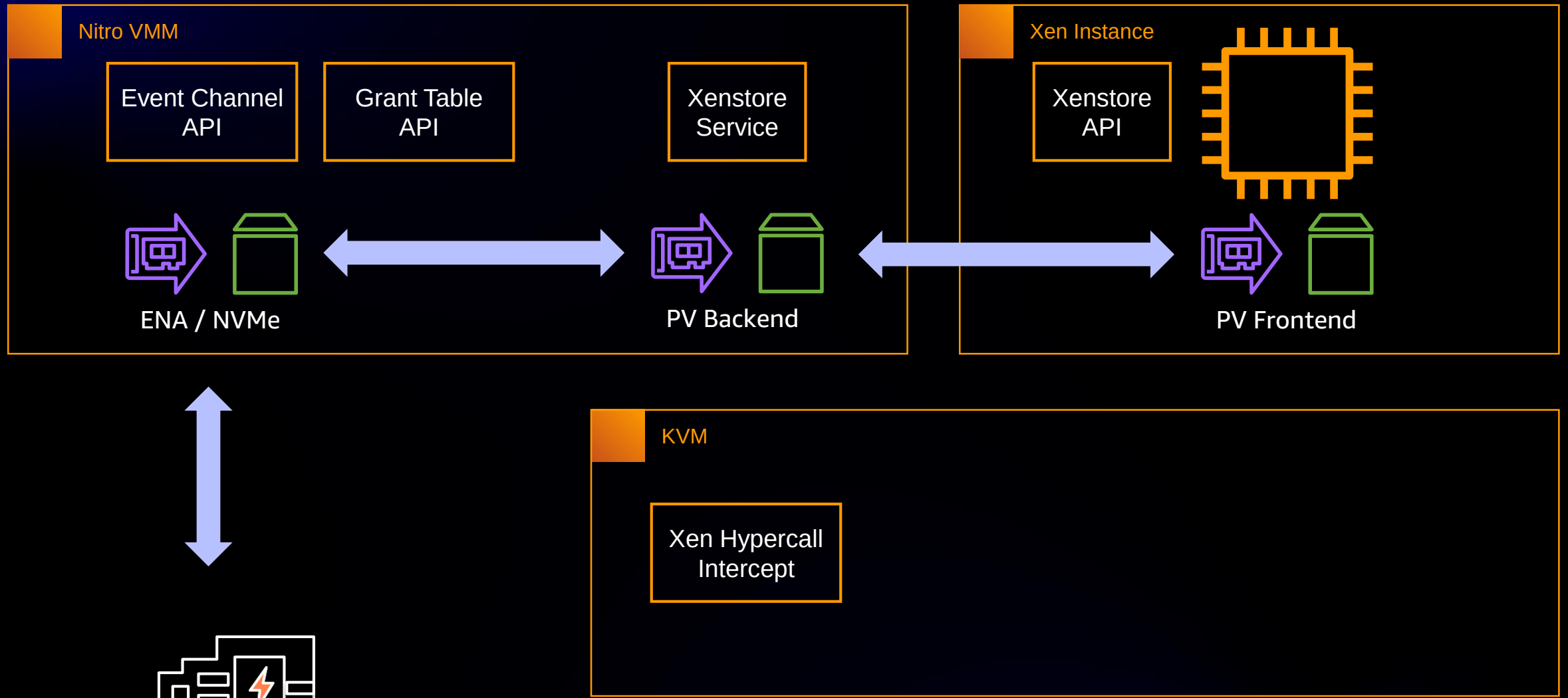
Nitro Card

aws

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What’s next?

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What’s next?

- Transparent – no changes to guest OS, AMIs, or drivers
- We start in Q1’22 with: C1, M1, M2, M3, C3, R3, T1 and I2
- Migration with just a reboot – all data gets migrated
- Same instance characteristics

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What about current generation instances?

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Thank you!

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