# Entitlement examples with physical and virtual clusters



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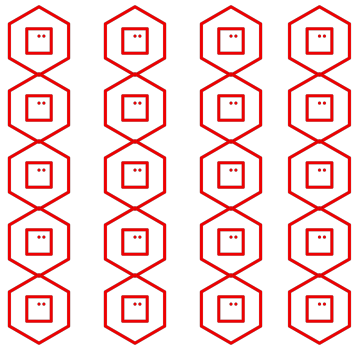
# Entitlement example #1

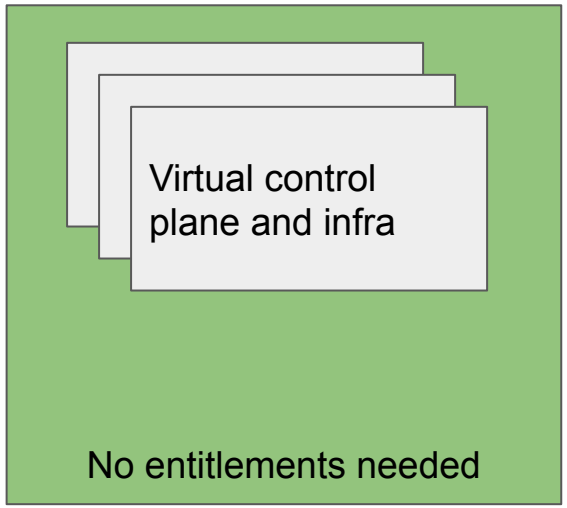
## Virtual OpenShift, any hypervisor

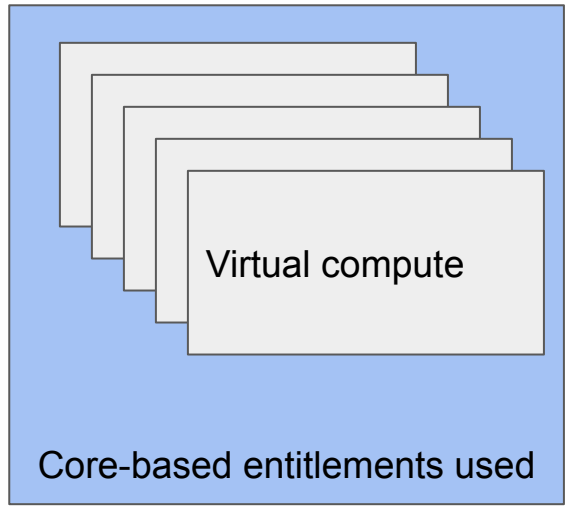


- Virtual OpenShift with container workload

All virtual clusters - regardless of hypervisor - must use core based entitlements for compute nodes.

This is true for any type of OpenShift deployment, full stack installer (IPI) or user provisioned infrastructure (UPI)



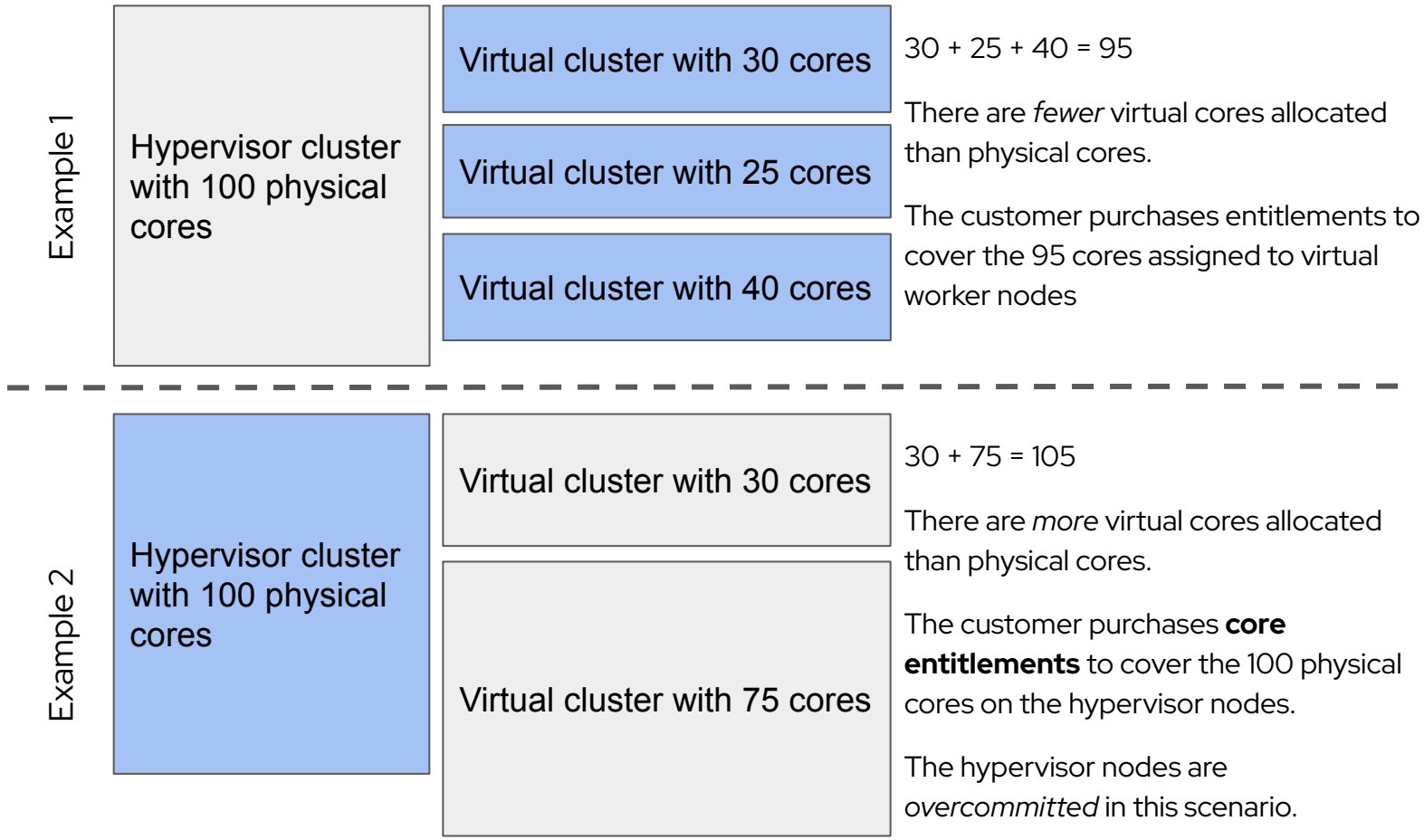



Reminder: no distinction is made between "full" and "hyperthreaded" cores in any of these examples. Use entitlement quantities that are appropriate for the virtual/physical hardware in use by your customer

# Core-based entitlements for virtual OpenShift clusters

- **All** virtual clusters - regardless of hypervisor - must use core based entitlements
- Customers purchase entitlements for the *lesser* core count between the number of cores assigned to virtual worker nodes or the physical cores in the underlying hypervisor cluster

**Note:** core counts in examples to right reflect worker node core counts, not total cores assigned - control plane and infra cores are not entitled unless running customer workload as outlined in the subscription guide.



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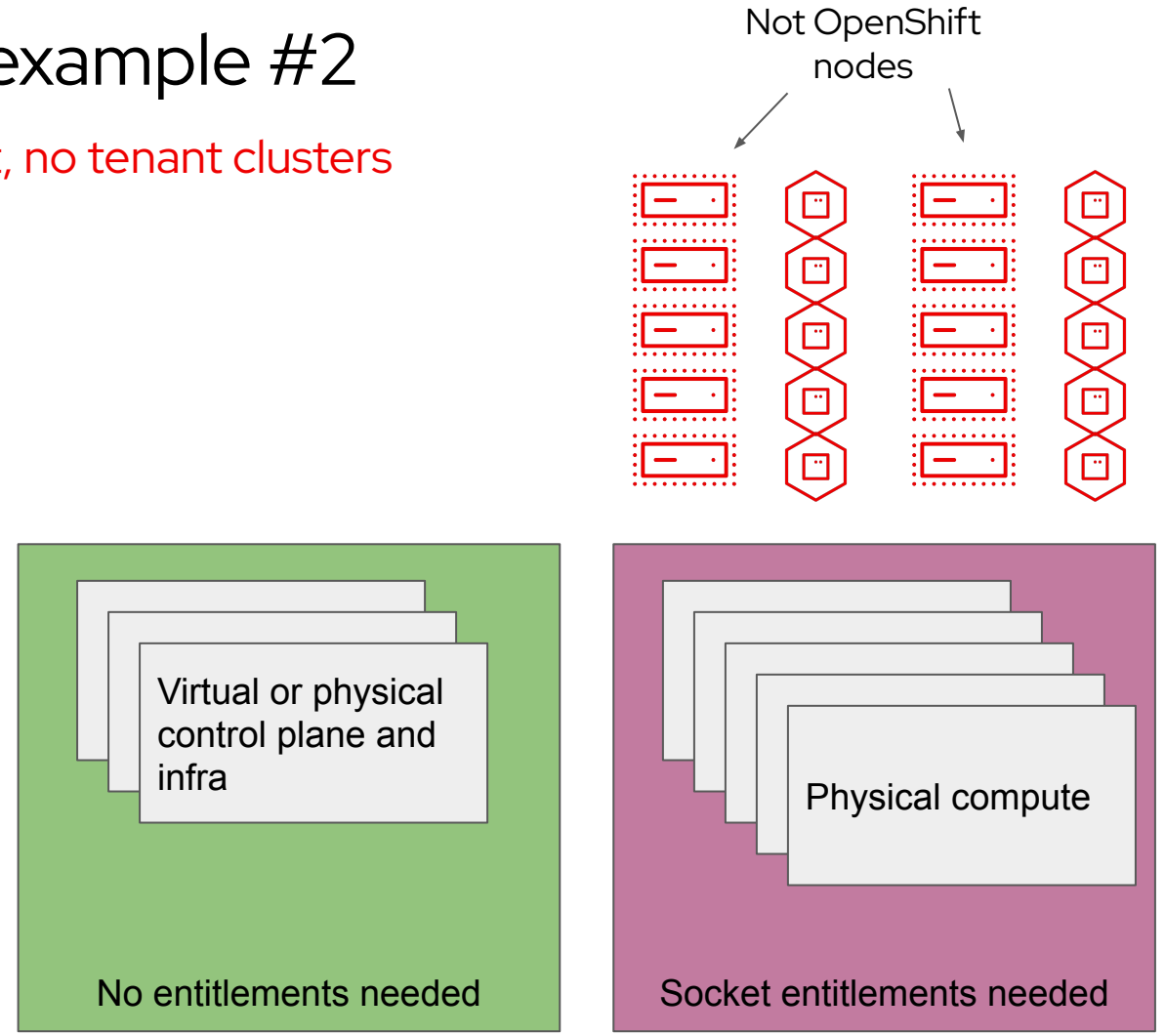
# Entitlement example #2

## Bare metal OpenShift, no tenant clusters

- Bare metal OpenShift with VMs and containers
- **No tenant/child/virtual OpenShift clusters** deployed as VMs using the non-integrated (a.k.a. bare metal UPI) or hosted control planes (a.k.a. hypershift) methods
- RHEL entitlements for guests deployed using OpenShift Virtualization are included with OpenShift

Customers need *socket-based entitlements for bare metal* OpenShift compute nodes



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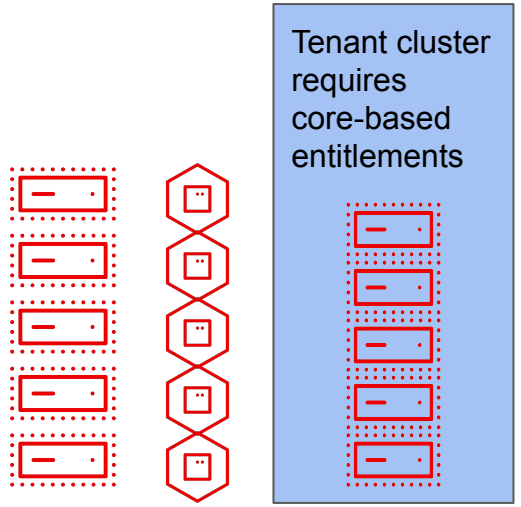
# Entitlement example #3

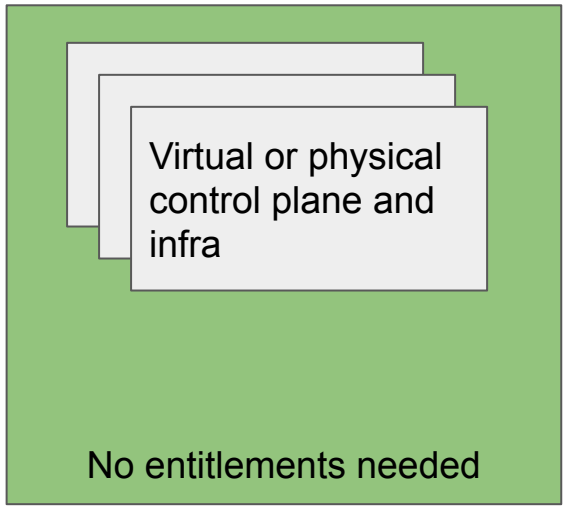
## Bare metal OpenShift, with tenant clusters and other workload

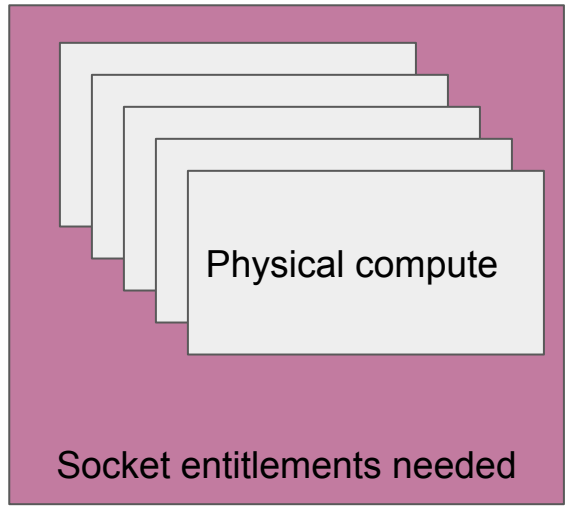



- Bare metal OpenShift with VMs and containers
- **One or more tenant/child/virtual OpenShift clusters** deployed as VMs using the non-integrated (a.k.a. bare metal UPI) or hosted control planes (a.k.a. hypershift) methods
- RHEL entitlements for guests deployed using OpenShift Virtualization are included with OpenShift

In this scenario, customers need *socket-based entitlements for all bare metal* OpenShift compute nodes, and …

Customers need *core-based entitlements for all virtualized* OpenShift compute nodes



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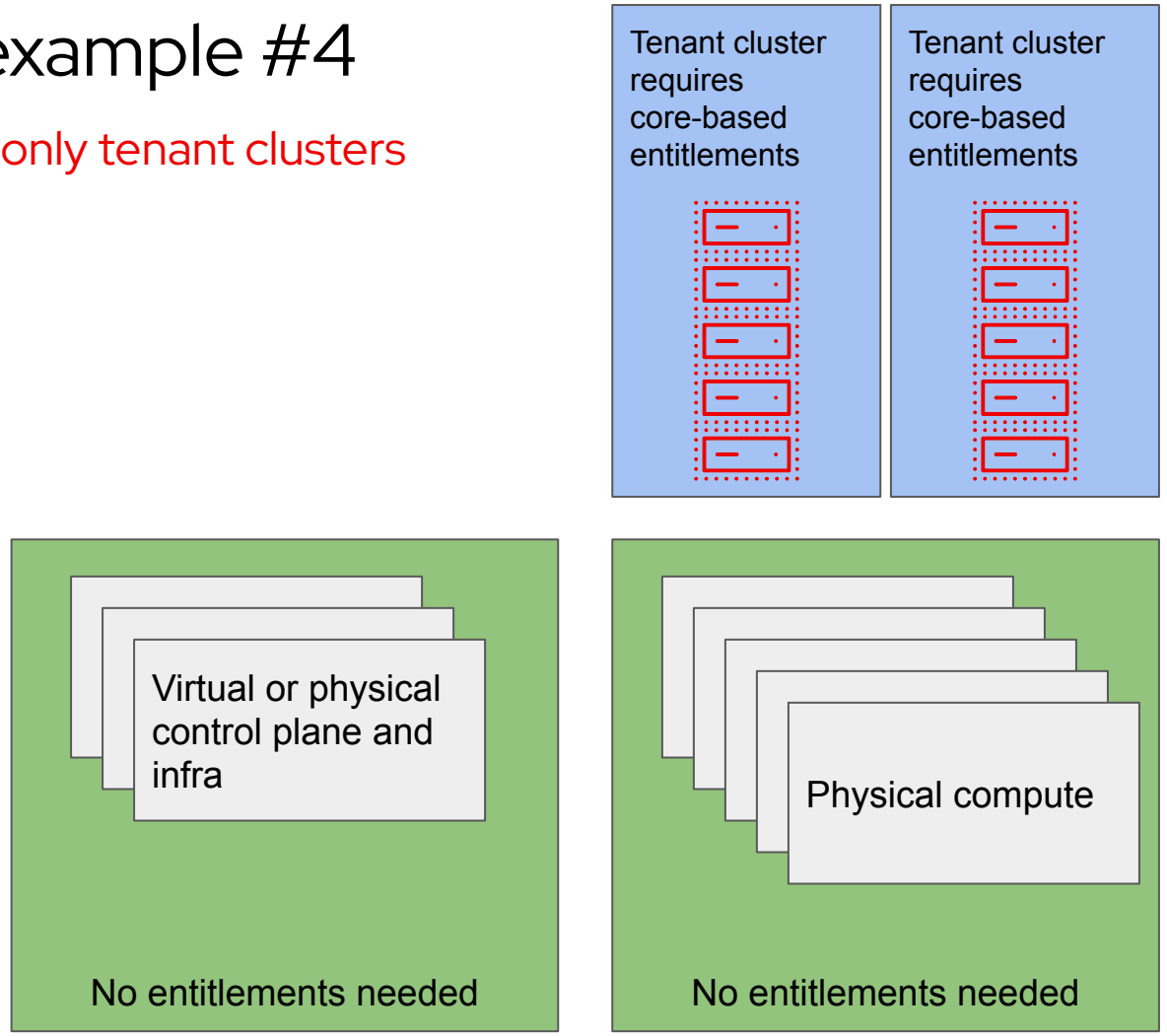
# Entitlement example #4

## Bare metal OpenShift, only tenant clusters

- Bare metal OpenShift with VMs
- **One or more tenant/child/virtual OpenShift clusters** deployed as VMs using the non-integrated (a.k.a. bare metal UPI) or hosted control planes (a.k.a. hypershift) methods
- Bare metal cluster hosts *no other workloads*

Customers need *core-based entitlements for all virtualized* OpenShift compute nodes



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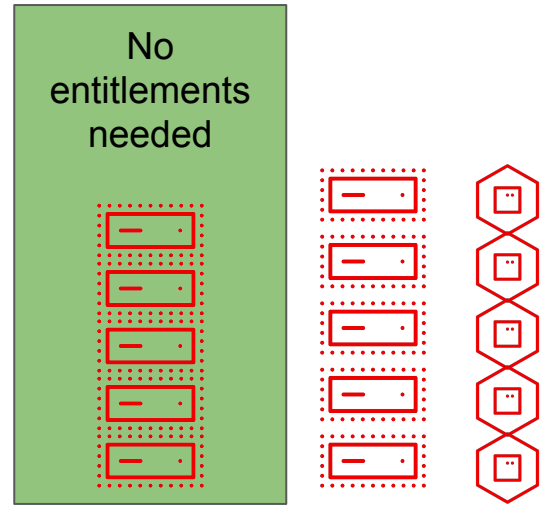
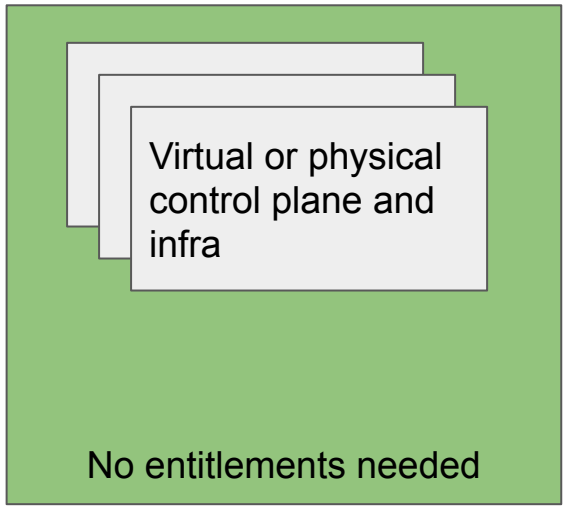
# Entitlement example #5

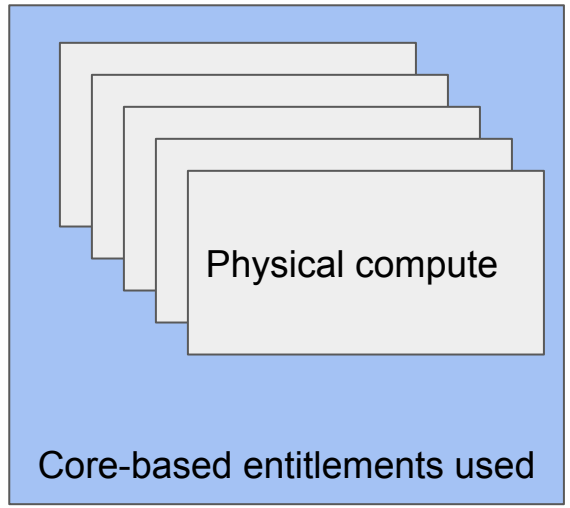
## Bare metal OpenShift, with overcommitted tenant clusters




- Bare metal OpenShift with VMs and containers
- **Zero or more tenant/child/virtual OpenShift clusters** deployed as VMs using the non-integrated (a.k.a. bare metal UPI) or hosted control planes (a.k.a. hypershift) methods
- Bare metal cluster is hosting workload other than tenant OpenShift clusters

When using *core-based entitlements for physical* OpenShift compute nodes, the customer can deploy as many tenant OpenShift clusters, containers on bare metal, and other VMs as desired on the bare metal cluster



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# Example #5: Pros and Cons

**Pros:**

- Maximum flexibility - all physical cores have core-based entitlements associated with them, which means no additional entitlements are needed for tenant clusters

**Cons:**

- Expensive - socket-based entitlements are significantly less expensive for the equivalent number of cores. Without oversubscription, there will be cost savings when using core-based entitlements for the tenant clusters

This scenario ***only*** makes sense when the customer intends to host tenant virtualized OpenShift clusters whose virtual core count exceeds the number of physical cores on the hardware, i.e. oversubscription of the physical cores. *Regardless of hypervisor*, when hosting virtual OpenShift clusters, the customer pays for the lesser core count between the virtual cores or physical cores.

Overcommitment is, generally, discouraged for OpenShift clusters, most customers are expected to fall into example #4, where the number of OpenShift virtual cores is less than the number of physical cores.

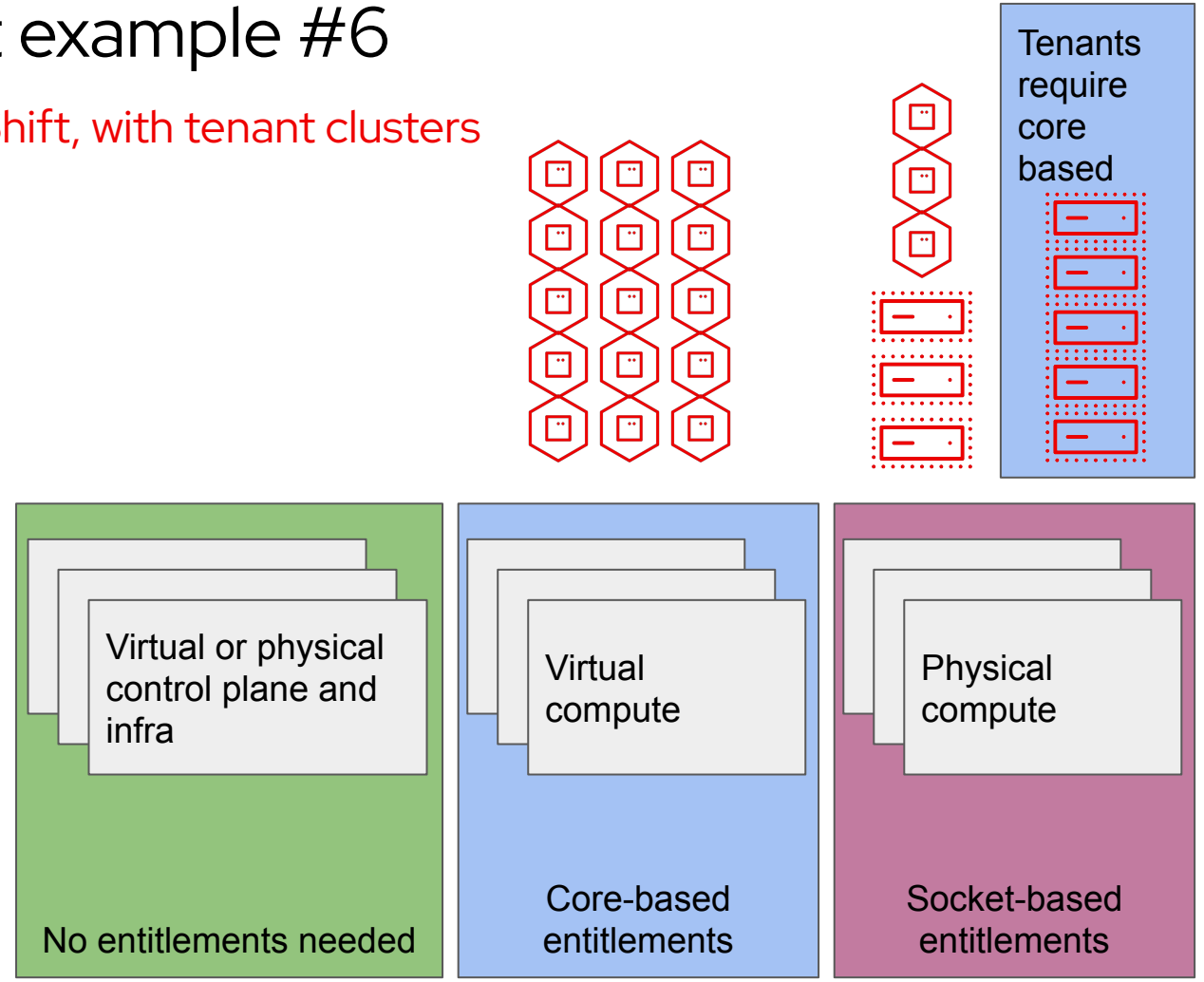
# Entitlement example #6

## Mixed platform OpenShift, with tenant clusters

- Mixed virtual and bare metal OpenShift with VMs and containers
- **Zero or more tenant/child/virtual OpenShift clusters** deployed as VMs using the non-integrated (a.k.a. bare metal UPI) or hosted control planes (a.k.a. hypershift) methods

Customers need *socket-based entitlements for all bare metal* OpenShift compute nodes

Customers need *core-based entitlements for all virtualized* OpenShift compute nodes, including tenant clusters






Reminder: no distinction is made between "full" and "hyperthreaded" cores in any of these examples. Use entitlement quantities that are appropriate for the virtual/physical hardware in use by your customer

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