

# VM은 어떻게 만들어질까?

(하이퍼바이저와 가상화)

AUSG 4기 우수연

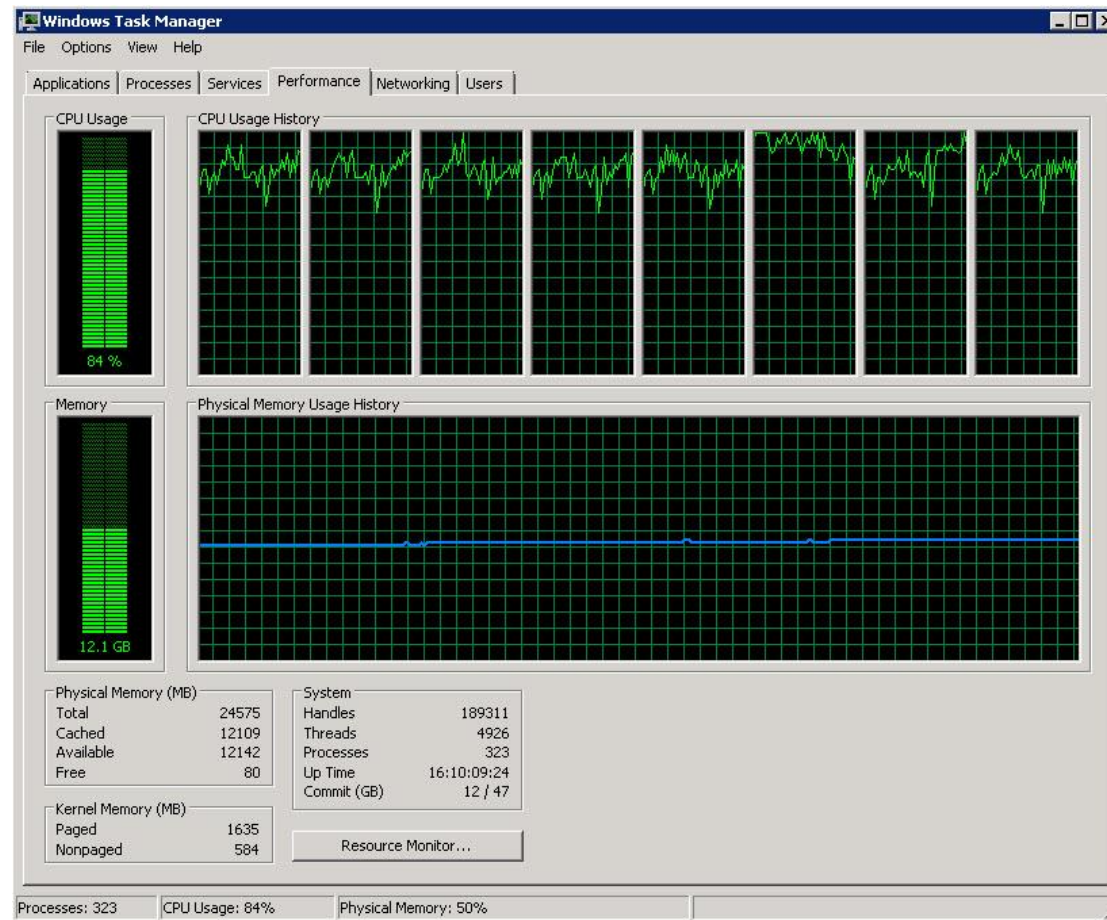
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3. 하이퍼바이저의 분류
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5. Xen Architecture
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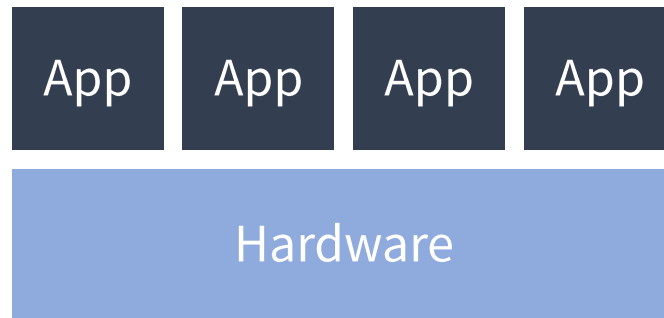
# 1. 가상화란?

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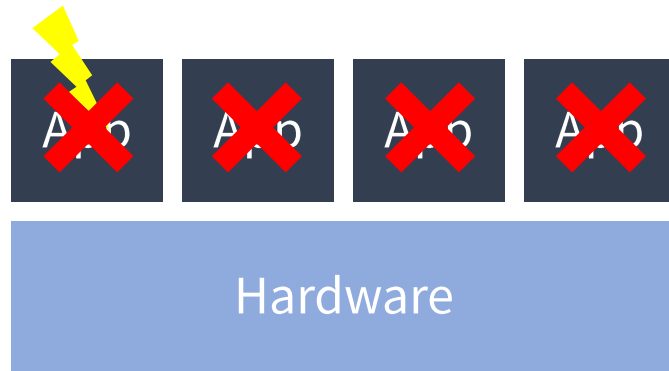
# 1. 가상화란?

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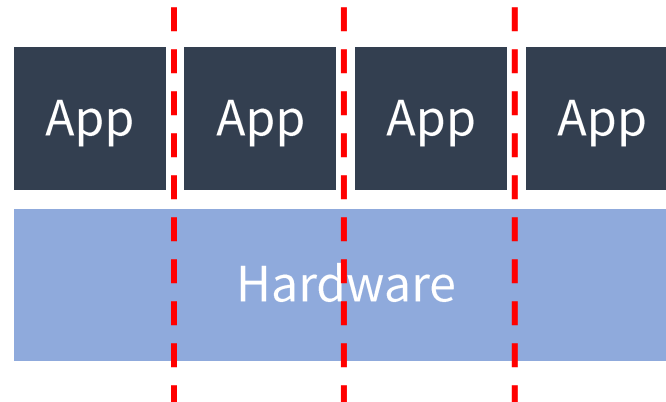
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# 1. 가상화란?

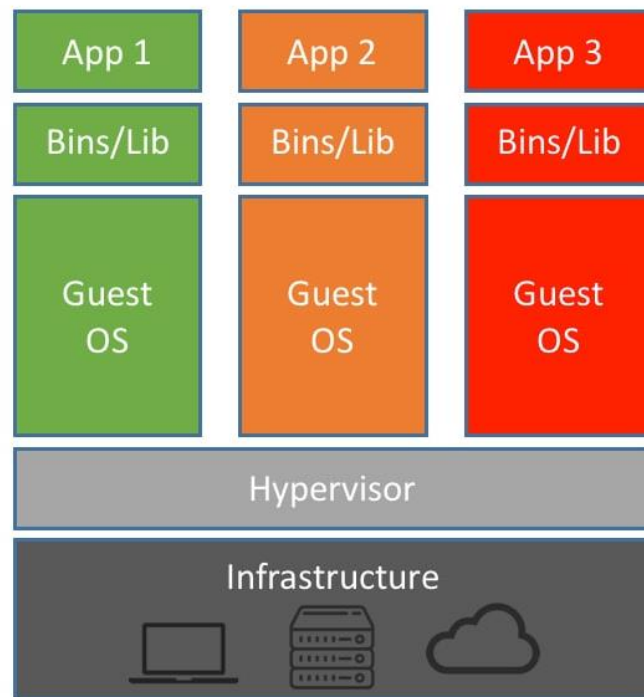
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## Isolation

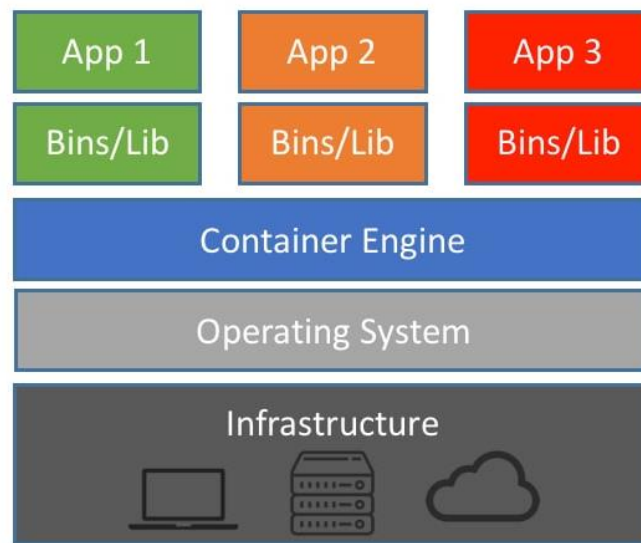


# 1. 가상화란?

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Machine Virtualization



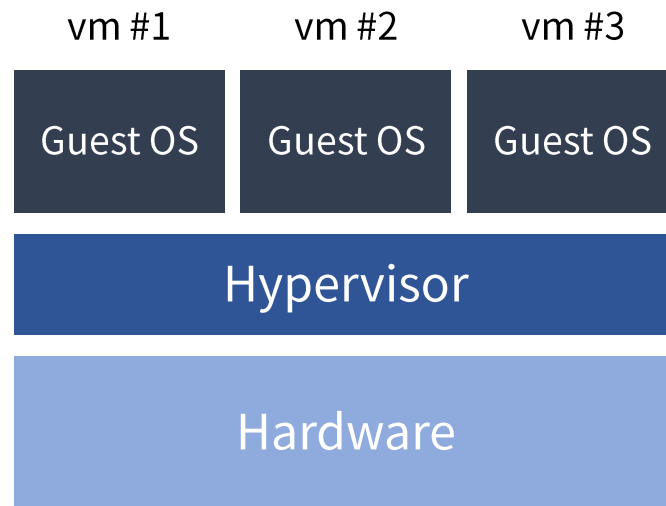
Containers



## **2. 하이퍼바이저란?**

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“

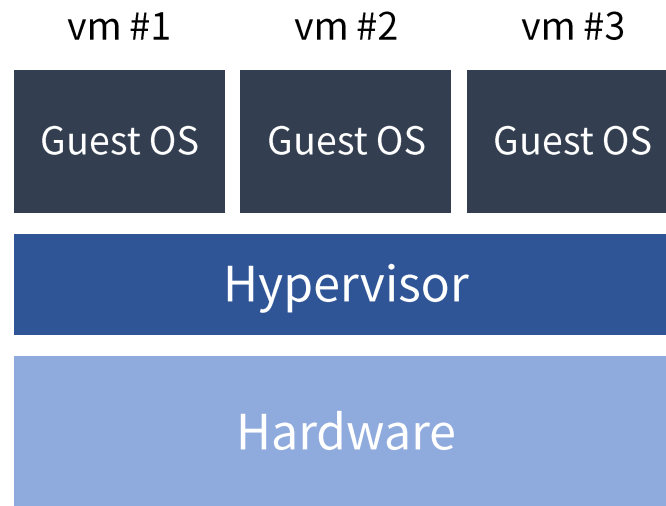
In general, operating systems are referred as supervisors.

As a hypervisor software is a supervisor of a “supervisor”, it is called hypervisor.

”

## 2. 하이퍼바이저란?

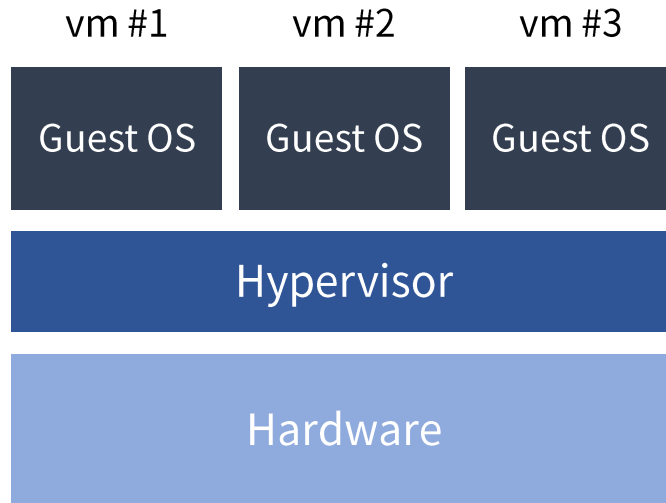
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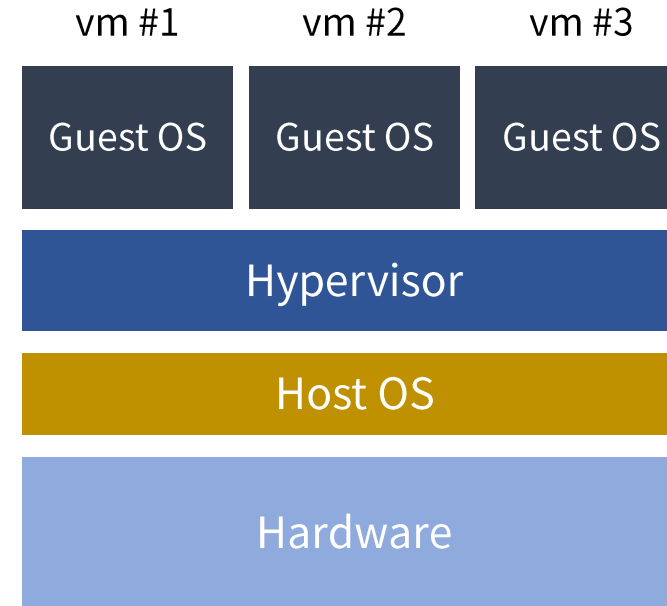
### **3. 하이퍼바이저의 분류**

# 3. 하이퍼바이저의 분류

**TYPE 1**  
(Native / Baremetal Hypervisor)



**TYPE 2**  
(Hosted Hypervisor)

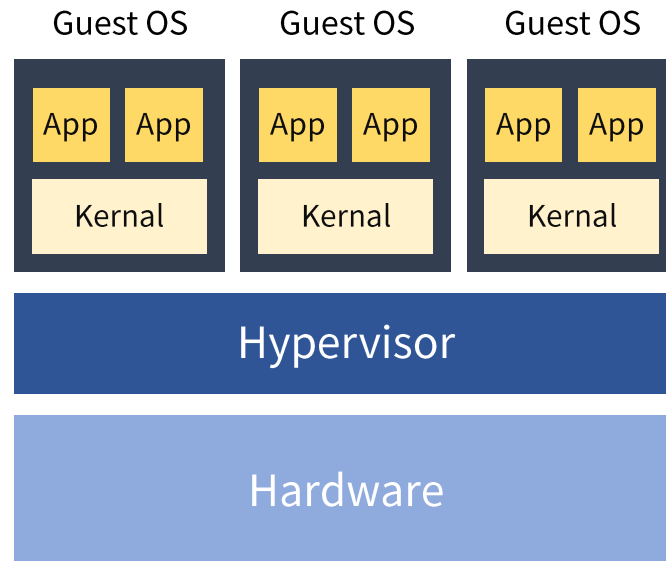


## **4. Full Virtualization vs Para Virtualization**

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## Full Virtualization (전가상화)

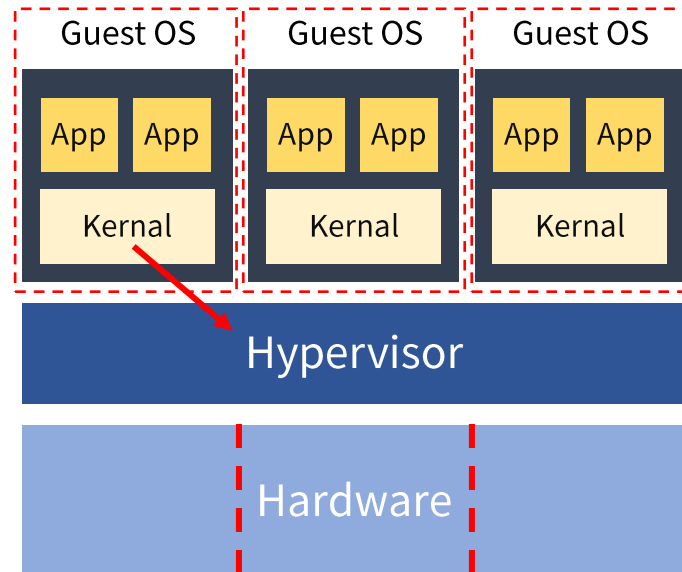




# 4. Full Virtualization vs Para Virtualization

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## Full Virtualization (전가상화)



## 4. Full Virtualization vs Para Virtualization

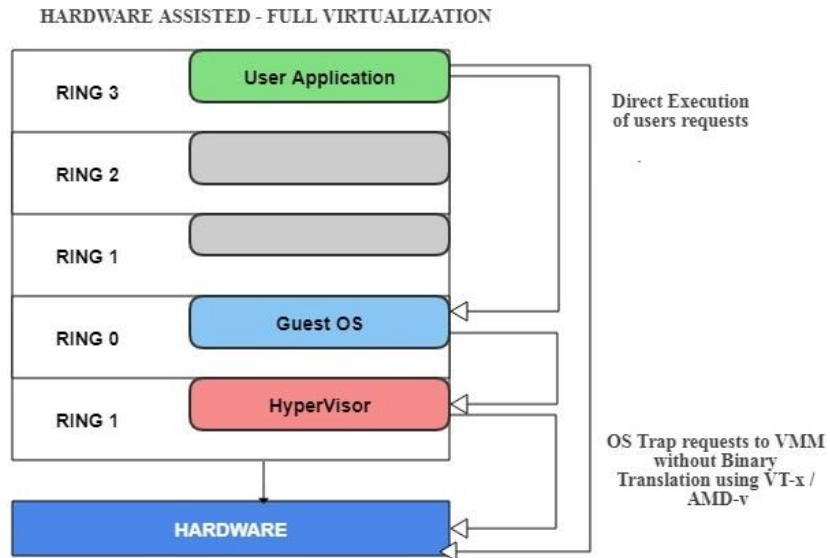
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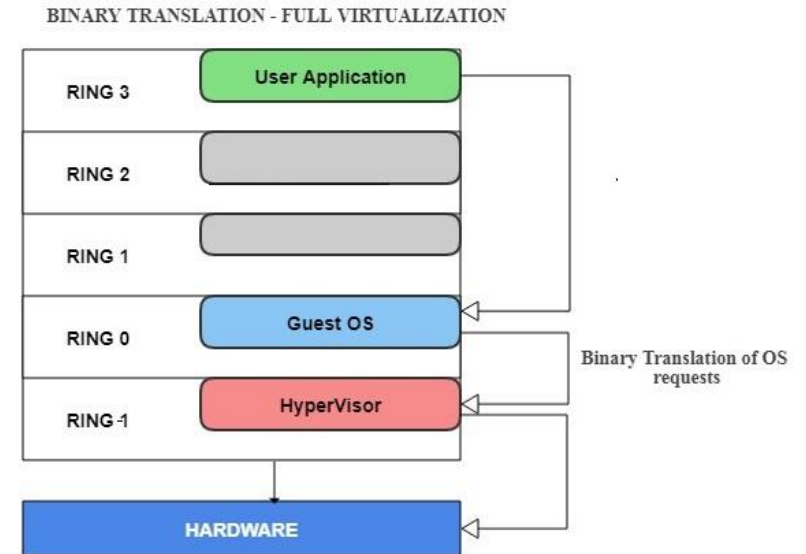
# 4. Full Virtualization vs Para Virtualization

## Full Virtualization (전가상화)

### Hardware Assisted Full Virtualization

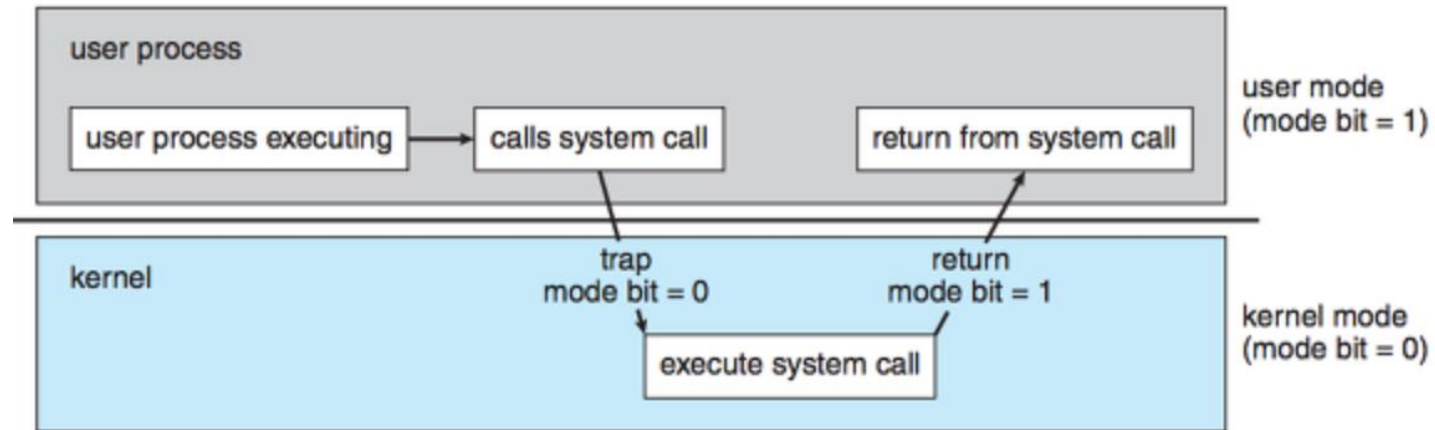


### Software Assisted Full Virtualization



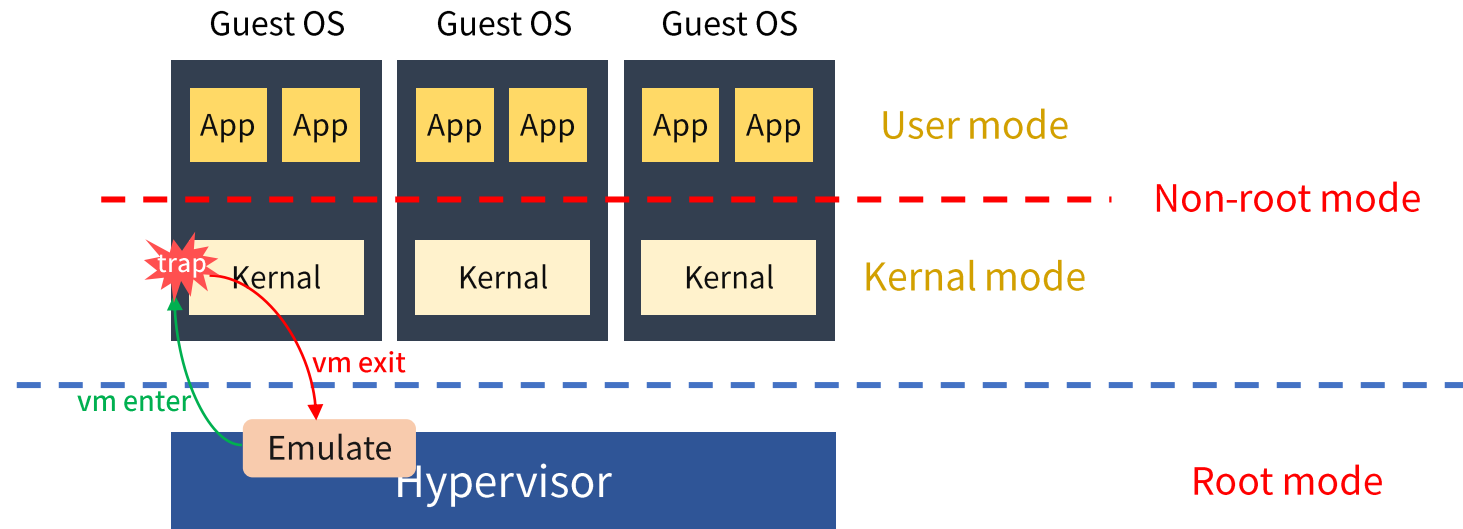
# 4. Full Virtualization vs Para Virtualization

## Dual-mode Operation (이중 동작 모드)



# 4. Full Virtualization vs Para Virtualization

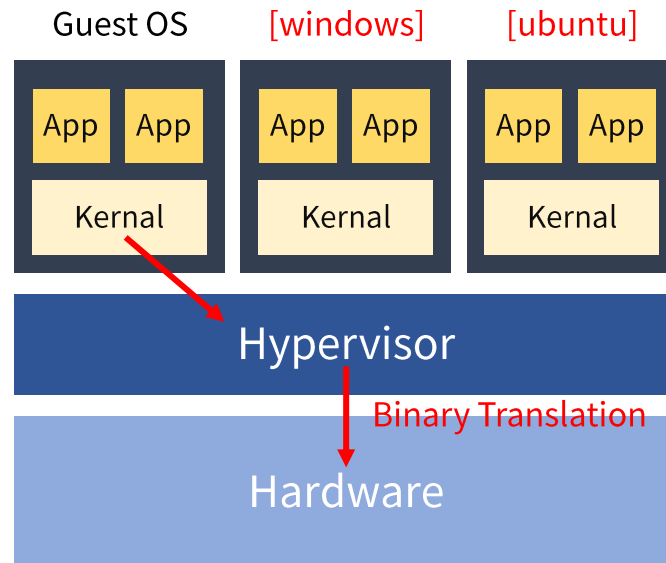
## Trap & Emulation (Intel VT-x 모드 전환 방법)



# 4. Full Virtualization vs Para Virtualization

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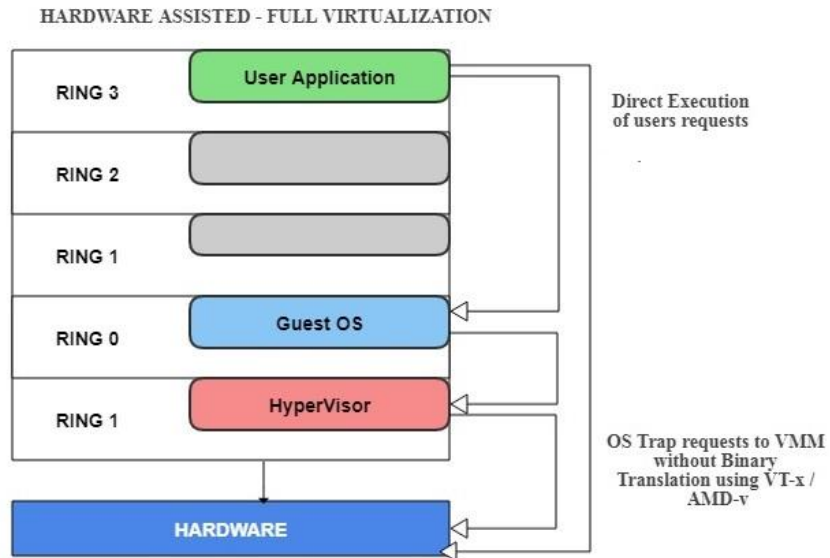
## Binary Translation



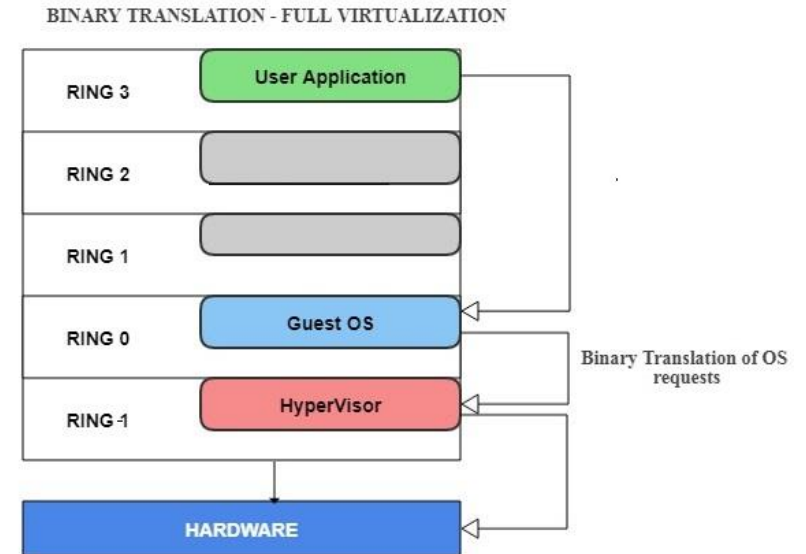
# 4. Full Virtualization vs Para Virtualization

## Full Virtualization (전가상화)

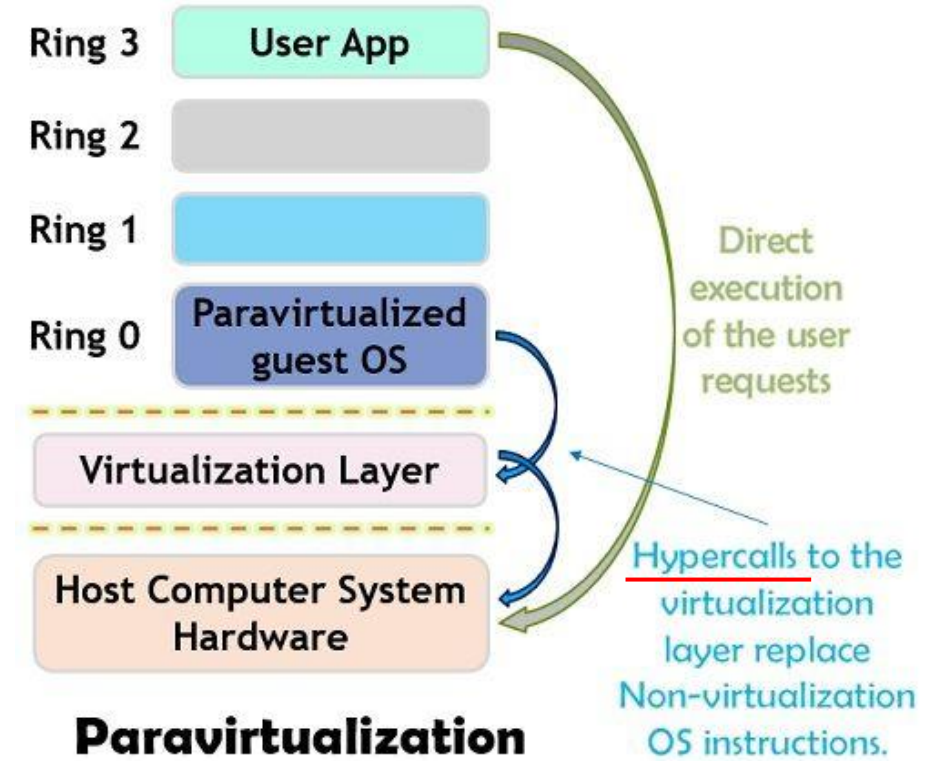
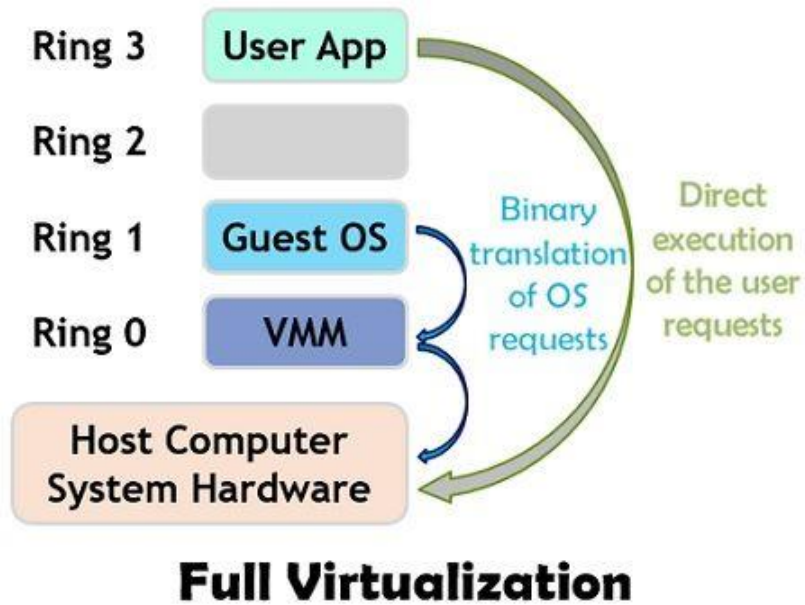
### Hardware Assisted Full Virtualization



### Software Assisted Full Virtualization



# 4. Full Virtualization vs Para Virtualization

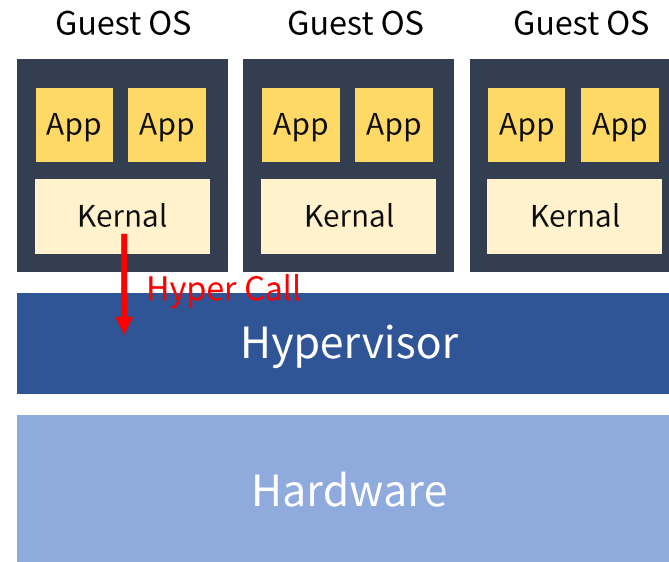




# 4. Full Virtualization vs Para Virtualization

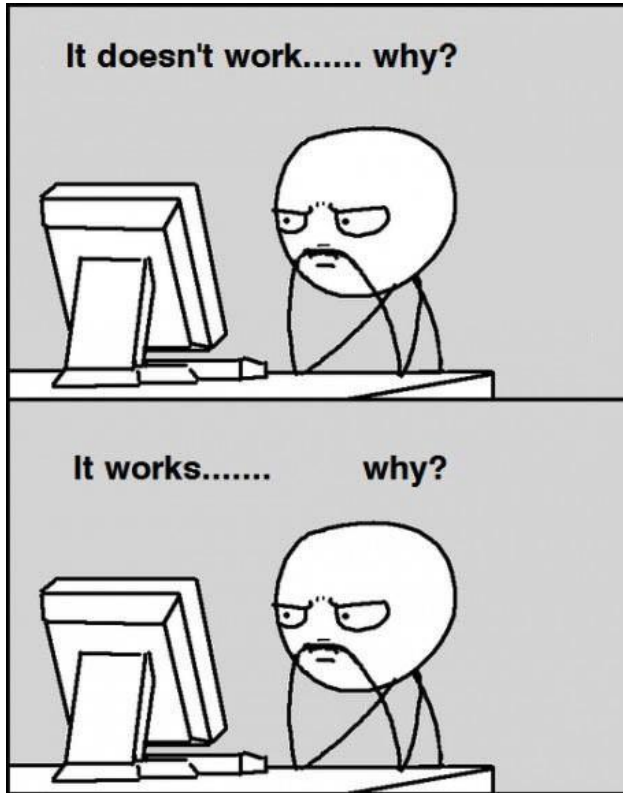
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## Hyper Call



## 4. Full Virtualization vs Para Virtualization

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## 4. Full Virtualization vs Para Virtualization

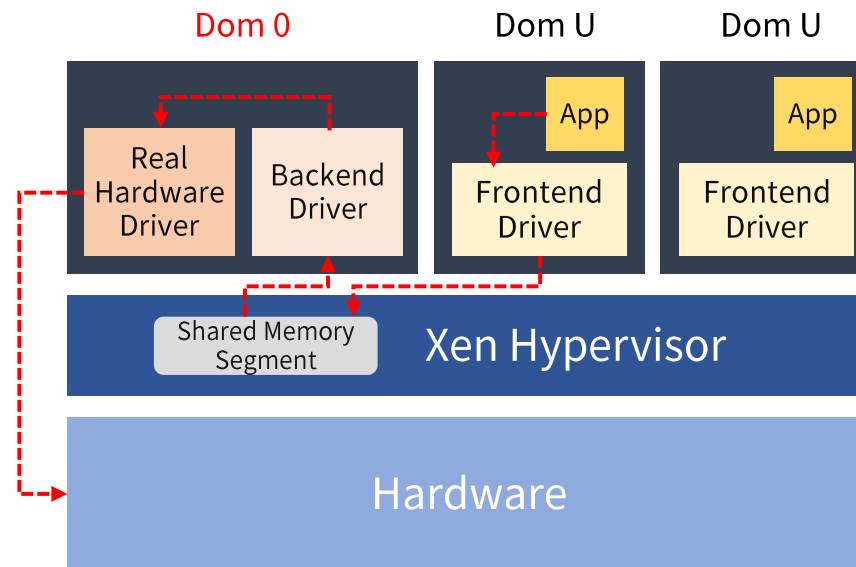
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```
xor eax, eax    # eax register 초기화  
mov cr0, eax    # control register 값 설정
```

## **5. Xen Architecture**

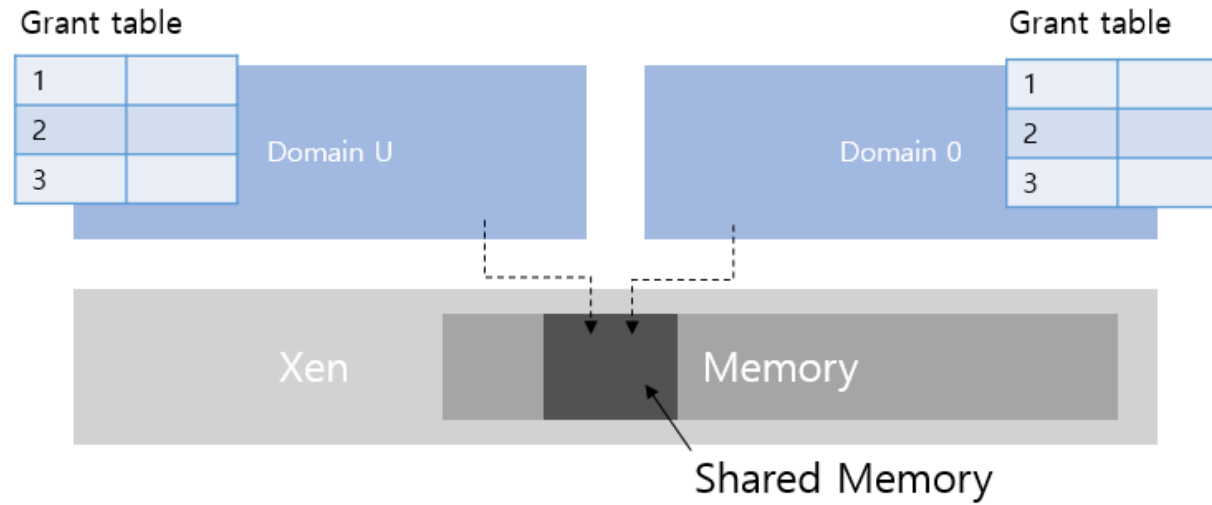
# 5. Xen Architecture

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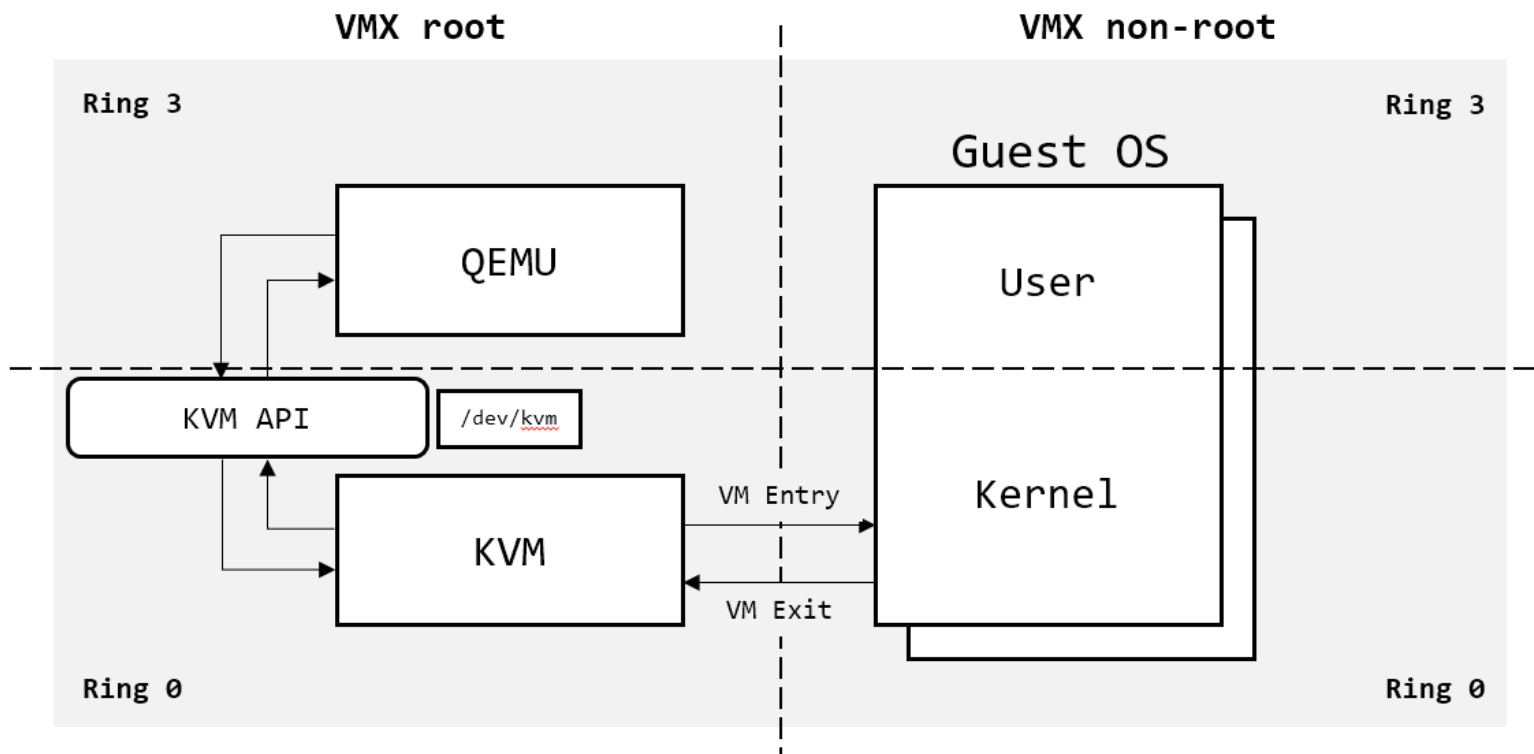
# 5. Xen Architecture

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## **6. KVM Architecture**

# 6. KVM Architecture





## **7. AWS EC2 Virtualization**

# 7. AWS EC2 Virtualization Types

## AWS EC2 Virtualization Types

					Importance Most → Least					
					CPU, Memory	Network I/O	Local Storage I/O	Remote Storage I/O	Interrupts, Timers	Motherboard, Boot
Old	#	Tech	Type	With						
	1	VM	Fully Emulated		VS	VS	VS	VS	VS	VS
	2	VM	Xen PV 3.0	PV drivers	P	P	P	P	VS	VS
	3	VM	Xen HVM 3.0	PV drivers	VH	P	P	P	VS	VS
	4	VM	Xen HVM 4.0.1	PVHVM drivers	VH	P	P	P	P	VS
	5	VM	Xen AWS 2013	PVHVM + SR-IOV(net)	VH	VH	P	P	P	VS
	6	VM	Xen AWS 2017	PVHVM + SR-IOV(net, stor.)	VH	VH	VH	P	P	VS
New	7	VM	AWS Nitro 2017		VH	VH	VH	VH	VH	VS
	8	HW	AWS Bare Metal 2017		H	H	H	H	H	H
Bare Metal					H	H	H	H	H	H

VM: Virtual Machine. HW: Hardware.

VS: Virt. in software. VH: Virt. in hardware. P: Paravirt. Not all combinations shown.

SR-IOV(net): ixgbe/ena driver. SR-IOV(storage): nvme driver.

**감사합니다!**