

KG GAME

On-Premise 구축 기술문서

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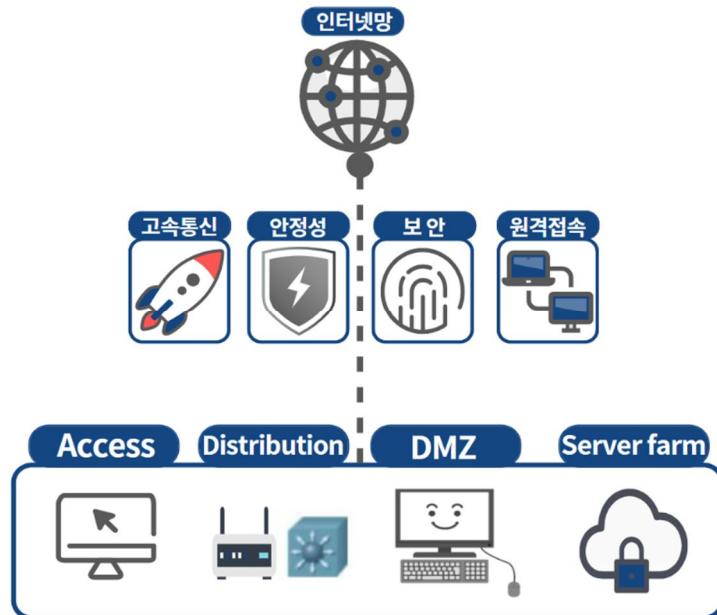
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사업 개요

1. 사업명 : KG GAME 네트워크 구축사업

2. 사업목적



1) 대규모 네트워크망을 구축하여 수월한 서버 트래픽 관리와 쾌적한 통신 환경 구축

2) 유저들의 정보 관리 시스템의 안정성과 보안성 확보

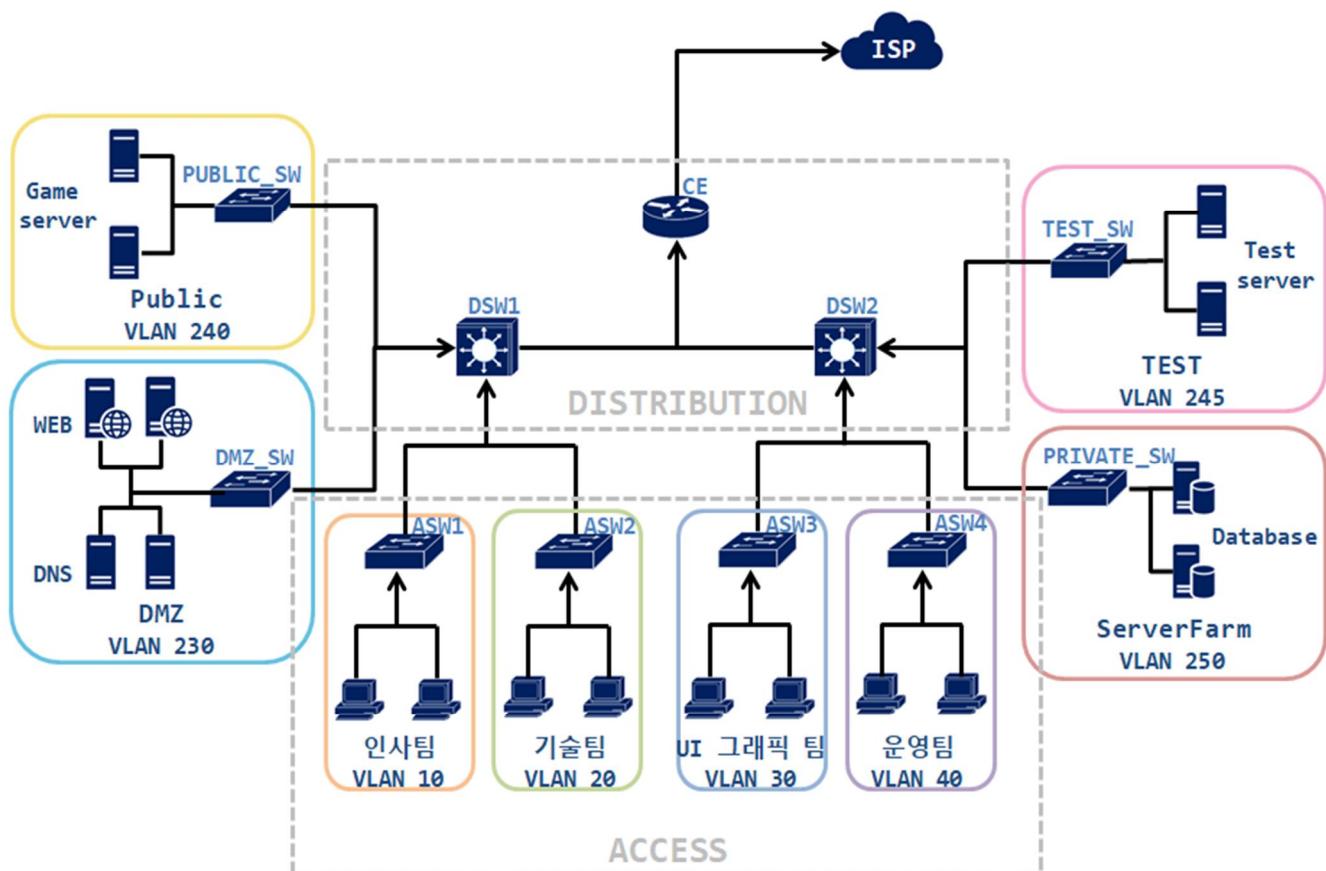
3. 제안요구 사항

- 1) 보안 및 트래픽 분산을 위해 회사 내부 네트워크 및 서버 VLAN 설정
- 2) 각 부서끼리 통신이 이뤄지도록 Trunk 연결 및 Inter-VLAN SVI 설정
- 3) 내외부 통신의 대역폭 확장 및 이중화 링크를 위한 Etherchannel 설정
- 4) 게이트웨이의 장애를 대비하여 HSRP를 이용한 게이트웨이 이중화 구현
- 5) 태그가 없어 보안성에 취약한 Native VLAN을 사용하지 않는 값으로 설정
- 6) Loop 방지 및 재연결 속도를 단축시키는 RSTP 및 Portfast 설정
- 7) 한정된 공인 IP주소 부족 문제를 해결하기 위한 NAT PAT 설정
- 8) 유저들의 개인정보 및 게임로그들을 저장하는 Database 서버와 개발을 위해 사용되는 Test서버는 철저한 보안 구축을 위해 ACL 설정

네트워크 토폴로지 구성

1. IP 할당 : 공인 IP – 192.10.10.0/24 & 사설 IP - 10.10.0.0/16

2. VLAN 네트워크 구조



VLAN 10	인사팀	VLAN 230	WEB 서버, DNS 서버
VLAN 20	기술팀	VLAN 240	Game 서버
VLAN 30	UI 그래픽팀	VLAN 245	Test 서버
VLAN 40	운영팀	VLAN 250	DB 서버

3. 장비 리스트

장비명	장비 유형	목적	장비명	장비 유형	목적
CE	Router	외부 통신	Public_SW	L2 Switch	Game서버 통신
DSW1	L3 Switch	라우팅	Test_SW	L2 Switch	Test서버 통신
DSW2	L3 Switch	라우팅	Private_SW	L2 Switch	DB서버 통신
ASW_HR	L2 Switch	내부 통신	WEB Server	Server	홈페이지 등 접속 연결
ASW_Tech	L2 Switch	내부 통신	DNS Server	Server	IP 주소 전환
ASW_UI	L2 Switch	내부 통신	Game Server	Server	게임 본 서버
ASW_Ope	L2 Switch	내부 통신	Test Server	Server	게임 테스트 서버
DMZ_SW	L2 Switch	WEB, DNS서버 통신	DB Server	Server	유저개인정보,로그저장서버
PC 1번 ~ 8번	End device	회사 내부 END Device			

4. 네트워크 대역 및 Server IP 정보

VLAN 10	Net	10.10.10.0/24	VLAN 30	Net	10.10.30.0/24
	PC1	10.10.10.1/24		PC1	10.10.40.1/24
	PC2	10.10.10.2/24		PC2	10.10.40.2/24
VLAN 10	Net	10.10.20.0/24	VLAN 40	Net	10.10.40.0/24
	PC1	10.10.20.1/24		PC1	10.10.40.1/24
	PC2	10.10.20.2/24		PC2	10.10.40.2/24

CE - DSW1	Net	10.10.100.0/30	CE - DSW2	Net	10.10.100.4/30
	CE	10.10.100.1/30		DSW2	10.10.100.5/30
	DSW1	10.10.100.2/30		CE	10.10.100.6/30

DSW1 - DSW2	Net	10.10.100.8/30
	DSW1	10.10.100.9/30
	DSW2	10.10.100.10/30

ServerFarm	DNS1(내부)	10.10.250.1/24
	DNS2(내부)	10.10.250.11/24
	WEB(인트라넷)	10.10.250.2/24
	Proxy	10.10.250.22/24
	AD	10.10.250.3/24
	DHCP1	10.10.250.4/24
	DHCP2	10.10.250.5/24
	VPN	10.10.250.6/24 (NAT : 192.10.10.100)
	DB1 (M)	10.10.250.7/24
	DB2 (S)	10.10.250.8/24

DMZ	DNS1 (M)	192.10.10.101/24
	DNS2 (S)	192.10.10.102/24
	WEB1 (M)	192.10.10.103/24
	WEB2 (S)	192.10.10.104/24
	Proxy1 (M)	192.10.10.105/24 (VRRP : 192.10.10.107)
	Proxy2 (S)	192.10.10.106/24 (VRRP : 192.10.10.107)

Game Server	192.10.10.120/24 ~ 192.10.10.220
Test Server	192.10.10.245/24 ~ 192.10.10.250

5. SVI별 IP

DSW1	IP	DSW2	IP
DSW1 SVI 10	10.10.10.252/24	DSW2 SVI 10	10.10.10.253/24
DSW1 SVI 20	10.10.20.252/24	DSW2 SVI 20	10.10.20.253/24
DSW1 SVI 30	10.10.30.252/24	DSW2 SVI 30	10.10.30.253/24
DSW1 SVI 40	10.10.40.252/24	DSW2 SVI 40	10.10.40.253/24
DSW1 SVI 230	192.10.10.232/24	DSW2 SVI 230	192.10.10.233/24
DSW1 SVI 240	192.10.10.242/24	DSW2 SVI 240	192.10.10.243/24
DSW1 SVI 245	192.10.10.252/24	DSW2 SVI 245	192.10.10.253/24
DSW1 SVI 250	10.10.250.252/24	DSW1 SVI 250	10.10.250.253/24

6. 장비별 포트 번호

장비명	포트	장비명	포트
ASW_HR – DSW1	[e2/0-1] ~ [e2/0-1]	ASW_HR – DSW2	[e2/2-3] ~ [e2/2-3]
ASW_Tech – DSW1	[e2/2-3 ~ [e2/2-3]	ASW_Tech – DSW2	[e2/0-1] ~ [e2/0-1]
ASW_UI – DSW1	[e2/0-1] ~ [e3/0-1]	ASW_UI – DSW2	[e2/2-3] ~ [e3/0-1]
ASW_Ope – DSW1	[e2/0-1] ~ [e3/2-3]	ASW_Ope – DSW2	[e2/2-3] ~ [e3/2-3]
DMZ_SW – DSW1	[e1/0-1] ~ [e0/2-3]	DMZ_SW – DSW2	[e1/2-3] ~ [e0/2-3]
Public_SW – DSW1	[e1/0-1] ~ [e1/0-1]	Public_SW – DSW2	[e1/2-3] ~ [e1/0-1]
Test_SW – DSW1	[e1/0-1] ~ [e4/0-1]	Test_SW – DSW2	[e1/2-3] ~ [e4/0-1]
Private_SW – DSW1	[e1/0-1] ~ [e1/2-3]	Private_SW – DSW2	[e1/2-3] ~ [e1/2-3]
DSW1 – DSW2	[e0/1] ~ [e0/1]	CE – ISP	[fa1/0] ~ [nat8]
CE – DSW1	[f0/0] ~ [e0/0]	CE – DSW2	[f0/1] ~ [e0/0]
WEB_Server1 – DMZ_SW	[e0/0-1] ~ [e0/0-1]	DNS_Server1 – DMZ_SW	[e0/2-3] ~ [e0/2-3]
WEB_Server2 – DMZ_SW	[e0/0-1] ~ [e2/0-1]	DNS_Server2 – DMZ_SW	[e0/0-1] ~ [e2/2-3]
Game_Server1 – Public_SW	[e0/0-1] ~ [e0/0-1]	Test_Server1 – Test_SW	[e0/0-1] ~ [e0/0-1]
Game_Server2 – Public_SW	[e0/0-1] ~ [e0/2-3]	Test_Server2 – Test_SW	[e0/0-1] ~ [e0/2-3]
DB_Server1 – Private_SW	[e0/0-1] ~ [e0/0-1]	DB_Server2 – Private_SW	[e0/0-1] ~ [e0/2-3]

네트워크 설정

1. PC IP 설정

```
HR_PC1 : ip 10.10.10.1 255.255.255.0 10.10.10.254  
HR-PC2 : ip 10.10.10.2 255.255.255.0 10.10.10.254  
Tech_PC1 : ip 10.10.20.1 255.255.255.0 10.10.20.254  
Tech_PC2 : ip 10.10.20.2 255.255.255.0 10.10.20.254  
UI_PC1 : ip 10.10.30.1 255.255.255.0 10.10.30.254  
UI_PC2 : ip 10.10.30.2 255.255.255.0 10.10.30.254  
Ope_PC1 : ip 10.10.40.1 255.255.255.0 10.10.40.254  
Ope_PC2 : ip 10.10.40.2 255.255.255.0 10.10.40.254
```

2. ASW 설정

▶ ASW_HR (인사팀)

1) 기본설정

```
IOU#configure terminal  
IOU#hostname ASW_HR  
ASW_HR(config)#enable secret kgb3  
ASW_HR(config)#no ip domain lookup  
ASW_HR(config)#line console 0  
ASW_HR(config-line)#logging synchronous  
ASW_HR(config-line)#exec-timeout 5 0  
ASW_HR(config-line)#password kggame123  
ASW_HR(config-line)#login  
ASW_HR(config-line)#exit
```

```
ASW_HR(config)#interface range ethernet 0/0-3, ethernet 1/0-3, ethernet 2/0-3, ethernet 3/0-3  
ASW_HR(config-if-range)#shutdown  
ASW_HR(config-if-range)#exit
```

2) VLAN 설정

```
ASW_HR(config)#vlan 10  
ASW_HR(config-vlan)#name HR  
ASW_HR(config-vlan)#exit
```

3) VLAN Access Link 설정

```
ASW_HR(config)#interface range ethernet 0/0-1
ASW_HR(config-if-range)#description ##HR_USER_PC##
ASW_HR(config-if-range)#switchport mode access
ASW_HR(config-if-range)#switchport access vlan 10
ASW_HR(config-if-range)#spanning-tree portfast
ASW_HR(config-if-range)#no shutdown
ASW_HR(config-if-range)#exit
```

4) VLAN Trunk Link 설정 및 Port Channel 구성

```
ASW_HR(config)#interface range ethernet 2/0-1
ASW_HR(config-if-range)#description ##DSW1_Uplink_Trunk_Port##
ASW_HR(config-if-range)#switchport trunk encapsulation dot1q
ASW_HR(config-if-range)#switchport trunk allowed vlan 10
ASW_HR(config-if-range)#switchport trunk native vlan 999
ASW_HR(config-if-range)#switchport mode trunk
ASW_HR(config-if-range)#switchport nonegotiate
ASW_HR(config-if-range)#channel-group 1 mode desirable
ASW_HR(config-if-range)#no shutdown
ASW_HR(config-if-range)#exit
ASW_HR(config)#interface range ethernet 2/2-3
ASW_HR(config-if-range)#description ##DSW2_Uplink_Trunk_Port##
ASW_HR(config-if-range)#switchport trunk encapsulation dot1q
ASW_HR(config-if-range)#switchport trunk allowed vlan 10
ASW_HR(config-if-range)#switchport trunk native vlan 999
ASW_HR(config-if-range)#switchport mode trunk
ASW_HR(config-if-range)#switchport nonegotiate
ASW_HR(config-if-range)#channel-group 2 mode desirable
ASW_HR(config-if-range)#no shutdown
ASW_HR(config)#end
ASW_HR#wr
```

▶ AWS_Tech (기술팀)

1) 기본설정

```
IOU#configure terminal
IOU(config)#hostname ASW_Tech
ASW_Tech(config)#enable secret kgb3
ASW_Tech(config)#no ip domain lookup
```

```
ASW_Tech(config)#line console 0
ASW_Tech(config-line)#logging synchronous
ASW_Tech(config-line)#exec-timeout 5 0
ASW_Tech(config-line)#password kggame123
ASW_Tech(config-line)#login
ASW_Tech(config-line)#exit

ASW_Tech(config)#interface range ethernet 0/0-3, ethernet 1/0-3, ethernet 2/0-3, ethernet 3/0-3
ASW_Tech(config-if-range)#shutdown
ASW_Tech(config-if-range)#exit
```

2) VLAN 설정

```
ASW_Tech(config)#vlan 20
ASW_Tech(config-vlan)#name Tech
ASW_Tech(config-vlan)#exit
```

3) VLAN Access Link 설정

```
ASW_Tech(config)#interface range ethernet 0/0-1
ASW_Tech(config-if-range)#description ##Tech_USER_PC##
ASW_Tech(config-if-range)#switchport mode access
ASW_Tech(config-if-range)#switchport access vlan 20
ASW_Tech(config-if-range)#spanning-tree portfast
ASW_Tech(config-if-range)#no shutdown
ASW_Tech(config-if-range)#exit
```

4) VLAN Trunk Link 설정 및 Port Channel 구성

```
ASW_Tech(config)#interface range ethernet 2/2-3
ASW_Tech(config-if-range)#description ##DSW1_Uplink_Trunk_Port##
ASW_Tech(config-if-range)#switch trunk encapsulation dot1q
ASW_Tech(config-if-range)#switchport trunk allowed vlan 20
ASW_Tech(config-if-range)#switchport trunk native vlan 999
ASW_Tech(config-if-range)#switchport mode trunk
ASW_Tech(config-if-range)#switchport nonegotiate
ASW_Tech(config-if-range)#channel-group 1 mode desirable
ASW_Tech(config-if-range)#no shutdown
ASW_Tech(config-if-range)#exit
ASW_Tech(config)#interface range ethernet 2/0-1
ASW_Tech(config-if-range)#description ##DSW2_Uplink_Trunk_port##
ASW_Tech(config-if-range)#switchport trunk encapsulation dot1q
```

```
ASW_Tech(config-if-range)#switchport trunk allowed vlan 20
ASW_Tech(config-if-range)#switchport trunk native vlan 999
ASW_Tech(config-if-range)#switchport mode trunk
ASW_Tech(config-if-range)#switchport nonegotiate
ASW_Tech(config-if-range)#channel-group 2 mode desirable
ASW_Tech(config-if-range)#no shutdown
ASW_Tech(config)#end
ASW_Tech#wr
```

▶ ASW_UI (그래픽팀)

1) 기본설정

```
IOU#configure terminal
IOU(config)#hostname ASW_UI
ASW_UI(config)#enable secret kgb3
ASW_UI(config)#no ip domain lookup
ASW_UI(config)#line console 0
ASW_UI(config-line)#logging synchronous
ASW_UI(config-line)#exec-timeout 5 0
ASW_UI(config-line)#password kggame123
ASW_UI(config-line)#login
ASW_UI(config-line)#exit
```

```
ASW_UI(config)#interface range ethernet 0/0-3, ethernet 1/0-3, ethernet 2/0-3, ethernet 3/0-3
ASW_UI(config-if-range)#shutdown
ASW_UI(config-if-range)#exit
```

2) VLAN 설정

```
ASW_UI(config)#vlan 30
ASW_UI(config-vlan)#name UI
ASW_UI(config-vlan)#exit
```

3) VLAN Access Link 설정

```
ASW_UI(config)#interface range ethernet 0/0-1
ASW_UI(config-if-range)#description ##UI_USER_PC##
ASW_UI(config-if-range)#switchport mode access
ASW_UI(config-if-range)#switchport access vlan 30
ASW_UI(config-if-range)#spanning-tree portfast
ASW_UI(config-if-range)#no shutdown
ASW_UI(config-if-range)#exit
```

4) VLAN Trunk Link 설정 및 Port Channel 구성

```
ASW_UI(config)#interface range ethernet 2/0-1
ASW_UI(config-if-range)#description ##DSW1_Uplink_Trunk_Port##
ASW_UI(config-if-range)#switchport trunk encapsulation dot1q
ASW_UI(config-if-range)#switchport trunk allowed vlan 30
ASW_UI(config-if-range)#switchport trunk native vlan 999
ASW_UI(config-if-range)#switchport mode trunk
ASW_UI(config-if-range)#switchport nonegotiate
ASW_UI(config-if-range)#channel-group 1 mode desirable
ASW_UI(config-if-range)#no shutdown
ASW_UI(config-if-range)#exit
ASW_UI(config)#interface range ethernet 2/2-3
ASW_UI(config-if-range)#description ##DSW2_Uplink_Trunk_Port##
ASW_UI(config-if-range)#switchport trunk encapsulation dot1q
ASW_UI(config-if-range)#switchport trunk allowed vlan 30
ASW_UI(config-if-range)#switchport trunk native vlan 999
ASW_UI(config-if-range)#switchport mode trunk
ASW_UI(config-if-range)#switchport nonegotiate
ASW_UI(config-if-range)#channel-group 2 mode desirable
ASW_UI(config-if-range)#no shutdown
ASW_UI(config)#end
ASW_UI#wr
```

▶ ASW_Ope (운영팀)

1) 기본설정

```
IOU(config)#hostname ASW_Ope
ASW_Ope(config)#enable secret kgb3
ASW_Ope(config)#no ip domain lookup
ASW_Ope(config)#line console 0
ASW_Ope(config-line)#logging synchronous
ASW_Ope(config-line)#exec-timeout 5 0
ASW_Ope(config-line)#password kggame123
ASW_Ope(config-line)#login
ASW_Ope(config-line)#exit
```

```
ASW_Ope(config)#interface range ethernet 0/0-3, ethernet 1/0-3, ethernet 2/0-3, ethernet 3/0-3
ASW_Ope(config-if-range)#shutdown
ASW_Ope(config-if-range)#exit
```

2) VLAN 설정

```
ASW_Ope(config)#vlan 40
ASW_Ope(config-vlan)#name Ope
ASW_Ope(config-vlan)#exit
```

3) VLAN Access Link 설정

```
ASW_Ope(config)#interface range ethernet 0/0-1
ASW_Ope(config-if-range)#description ##Ope_USER_PC##
ASW_Ope(config-if-range)#switchport mode access
ASW_Ope(config-if-range)#switchport access vlan 40
ASW_Ope(config-if-range)#spanning-tree portfast
ASW_Ope(config-if-range)#no shutdown
ASW_Ope(config-if-range)#exit
```

4) VLAN Trunk Link 설정 및 Port Channel 구성

```
ASW_Ope(config)#interface range ethernet 2/0-1
ASW_Ope(config-if-range)#description ##DSW1_Uplink_Trunk_Port##
ASW_Ope(config-if-range)#switchport trunk encapsulation dot1q
ASW_Ope(config-if-range)#switchport trunk allowed vlan 40
ASW_Ope(config-if-range)#switchport trunk native vlan 999
ASW_Ope(config-if-range)#switchport mode trunk
ASW_Ope(config-if-range)#switchport nonegotiate
ASW_Ope(config-if-range)#channel-group 1 mode desirable
ASW_Ope(config-if-range)#no shutdown
ASW_Ope(config-if-range)#exit
ASW_Ope(config)#interface range ethernet 2/2-3
ASW_Ope(config-if-range)#description ##DSW2_Uplink_Trunk_Port##
ASW_Ope(config-if-range)#switchport trunk encapsulation dot1q
ASW_Ope(config-if-range)#switchport trunk allowed vlan 40
ASW_Ope(config-if-range)#switchport trunk native vlan 999
ASW_Ope(config-if-range)#switchport mode trunk
ASW_Ope(config-if-range)#switchport nonegotiate
ASW_Ope(config-if-range)#channel-group 2 mode desirable
ASW_Ope(config-if-range)#no shutdown
ASW_Ope(config)#end
ASW_Ope#wr
```

3. DMZ_SW 설정 (WEB/DNS)

1) 기본설정

```
IOU#configure terminal  
IOU(config)#hostname DMZ_SW  
DMZ_SW(config)#enable secret kgb3  
DMZ_SW(config)#no ip domain lookup  
DMZ_SW(config)#line console 0  
DMZ_SW(config-line)#logging synchronous  
DMZ_SW(config-line)#exec-timeout 5 0  
DMZ_SW(config-line)#password kggame123  
DMZ_SW(config-line)#login  
DMZ_SW(config-line)#exit  
DMZ_SW(config)#interface range e 0/0-3, e 1/0-3, e 2/0-3, e 3/0-3  
DMZ_SW(config-if-range)#shutdown  
DMZ_SW(config-if-range)#exit
```

2) VLAN 설정

```
DMZ_SW(config)#vlan 230  
DMZ_SW(config-vlan)#name DMZ  
DMZ_SW(config-vlan)#exit
```

3) VLAN Access Link 설정 및 Port Channel 구성

```
DMZ_SW(config)#interface range e 0/0-3,e 2/0-3  
DMZ_SW(config-if-range)#desc ##DMZ_Server##  
DMZ_SW(config-if-range)#switchport mode access  
DMZ_SW(config-if-range)#switchport access vlan 230  
DMZ_SW(config-if-range)#spanning-tree portfast  
DMZ_SW(config-if-range)#no shutdown  
DMZ_SW(config-if-range)#exit  
  
DMZ_SW(config)#interface range e 0/0-1  
DMZ_SW(config-if-range)#channel-group 3 mode desirable  
DMZ_SW(config-if-range)#exit  
DMZ_SW(config)#interface range e 0/2-3  
DMZ_SW(config-if-range)#channel-group 4 mode desirable  
DMZ_SW(config-if-range)#exit  
DMZ_SW(config)#interface range e 2/0-1
```

```
DMZ_SW(config-if-range)#channel-group 5 mode desirable  
DMZ_SW(config-if-range)#exit  
DMZ_SW(config)#interface range e 2/2-3  
DMZ_SW(config-if-range)#channel-group 6 mode desirable  
DMZ_SW(config-if-range)#exit
```

4) VLAN Trunk Link 설정 및 Port Channel 구성

```
DMZ_SW(config)#int range e 1/0-1  
DMZ_SW(config-if-range)#desc ##DSW1_Uplink_Trunk_Port##  
DMZ_SW(config-if-range)#switchport trunk encapsulation dot1q  
DMZ_SW(config-if-range)#switchport trunk allowed vlan 230  
DMZ_SW(config-if-range)#switchport trunk native vlan 999  
DMZ_SW(config-if-range)#switchport mode trunk  
DMZ_SW(config-if-range)#switchport nonegotiate  
DMZ_SW(config-if-range)#channel-group 1 mode desirable  
DMZ_SW(config-if-range)#no shutdown  
DMZ_SW(config-if-range)#exit  
DMZ_SW(config)#interface range e 1/2-3  
DMZ_SW(config-if-range)#desc ##DSW2_Uplink_Trunk_Port##  
DMZ_SW(config-if-range)#switchport trunk encapsulation dot1q  
DMZ_SW(config-if-range)#switchport trunk allowed vlan 230  
DMZ_SW(config-if-range)#switchport trunk native vlan 999  
DMZ_SW(config-if-range)#switchport mode trunk  
DMZ_SW(config-if-range)#switchport nonegotiate  
DMZ_SW(config-if-range)#channel-group 2 mode desirable  
DMZ_SW(config-if-range)#no shutdown  
DMZ_SW(config)#end  
DMZ_SW#wr
```

4. Public_SW 설정 (Game Server)

1) 기본설정

```
IOU#configure terminal  
IOU(config)#hostname Public_SW  
Public_SW(config)#enable secret kgb3  
Public_SW(config)#no ip domain lookup  
Public_SW(config)#line console 0  
Public_SW(config-line)#logging synchronous  
Public_SW(config-line)#exec-timeout 5 0
```

```
Public_SW(config-line)#password kggame123
Public_SW(config-line)#login
Public_SW(config-line)#exit
Public_SW(config)#interface range e 0/0-3, e 1/0-3, e 2/0-3, e 3/0-3
Public_SW(config-if-range)#shutdown
Public_SW(config-if-range)#exit
```

2) VLAN 설정

```
Public_SW(config)#vlan 240
Public_SW(config-vlan)#name Public
Public_SW(config-vlan)#exit
```

3) VLAN Access Link 설정 및 Port Channel 구성

```
Public_SW(config)#interface range e 0/0-1
Public_SW(config-if-range)#desc ##Public_Server##
Public_SW(config-if-range)#switchport mode access
Public_SW(config-if-range)#switchport access vlan 240
Public_SW(config-if-range)#spanning-tree portfast
Public_SW(config-if-range)#channel-group 3 mode desirable
Public_SW(config-if-range)#no shutdown
Public_SW(config-if-range)#exit
```

4) VLAN Trunk Link 설정 및 Port Channel 구성

```
Public_SW(config)#interface range e 1/0-1
Public_SW(config-if-range)#desc ##DSW1_Uplink_Trunk_Port##
Public_SW(config-if-range)#switchport trunk encapsulation dot1q
Public_SW(config-if-range)#switchport trunk allowed vlan 240
Public_SW(config-if-range)#switchport trunk native vlan 999
Public_SW(config-if-range)#switchport mode trunk
Public_SW(config-if-range)#switchport nonegotiate
Public_SW(config-if-range)#channel-group 1 mode desirable
Public_SW(config-if-range)#no shutdown
Public_SW(config-if-range)#exit
Public_SW(config)#interface range e 1/2-3
Public_SW(config-if-range)#desc ##DSW2_Uplink_Trunk_Port##
Public_SW(config-if-range)#switchport trunk encapsulation dot1q
Public_SW(config-if-range)#switchport trunk allowed vlan 240
Public_SW(config-if-range)#switchport trunk native vlan 999
```

```
Public_SW(config-if-range)#switchport mode trunk  
Public_SW(config-if-range)#switchport nonegotiate  
Public_SW(config-if-range)#channel-group 2 mode desirable  
Public_SW(config-if-range)#no shutdown  
Public_SW(config)#end  
Public_SW#wr
```

5. Test_SW 설정 (Test_Server)

1) 기본설정

```
IOU#configure terminal  
IOU(config)#hostname Test_SW  
Test_SW(config)#enable secret kgb3  
Test_SW(config)#no ip domain lookup  
Test_SW(config)#line console 0  
Test_SW(config-line)#logging synchronous  
Test_SW(config-line)#exec-timeout 5 0  
Test_SW(config-line)#password kggame123  
Test_SW(config-line)#login  
Test_SW(config-line)#exit  
Test_SW(config)#interface range e 0/0-3, e 1/0-3, e 2/0-3, e 3/0-3  
Test_SW(config-if-range)#shutdown  
Test_SW(config-if-range)#exit
```

2) VLAN 설정

```
Test_SW(config)#vlan 245  
Test_SW(config-vlan)#name Test  
Test_SW(config-vlan)#exit
```

3) VLAN Access Link 설정 및 Port Channel 구성

```
Test_SW(config)#interface range e 0/0-1  
Test_SW(config-if-range)#desc ##Test_Server##  
Test_SW(config-if-range)#switchport mode access  
Test_SW(config-if-range)#switchport access vlan 245  
Test_SW(config-if-range)#spanning-tree portfast  
Test_SW(config-if-range)#channel-group 3 mode desirable  
Test_SW(config-if-range)#no shutdown  
Test_SW(config-if-range)#exit
```

4) VLAN Trunk Link 설정 및 Port Channel 구성

```
Test_SW(config)#interface range e 1/0-1
Test_SW(config-if-range)#desc ##DSW1_Uplink_Trunk_Port##
Test_SW(config-if-range)#switchport trunk encapsulation dot1q
Test_SW(config-if-range)#switchport trunk allowed vlan 245
Test_SW(config-if-range)#switchport trunk native vlan 999
Test_SW(config-if-range)#switchport mode trunk
Test_SW(config-if-range)#switchport nonegotiate
Test_SW(config-if-range)#channel-group 1 mode desirable
Test_SW(config-if-range)#no shutdown
Test_SW(config-if-range)#exit
Test_SW(config)#interface range e 1/2-3
Test_SW(config-if-range)#desc ##DSW2_Uplink_Trunk_Port##
Test_SW(config-if-range)#switchport trunk encapsulation dot1q
Test_SW(config-if-range)#switchport trunk allowed vlan 245
Test_SW(config-if-range)#switchport trunk native vlan 999
Test_SW(config-if-range)#switchport mode trunk
Test_SW(config-if-range)#switchport nonegotiate
Test_SW(config-if-range)#channel-group 2 mode desirable
Test_SW(config-if-range)#no shutdown
Test_SW(config)#end
Test_SW#wr
```

6. Private_SW 설정 (DB)

1) 기본설정

```
IOU#configure terminal
IOU(config)#hostname Private_SW
Private_SW(config)#enable secret kgb3
Private_SW(config)#no ip domain lookup
Private_SW(config)#line console 0
Private_SW(config-line)#logging synchronous
Private_SW(config-line)#exec-timeout 5 0
Private_SW(config-line)#password kggame123
Private_SW(config-line)#login
Private_SW(config-line)#exit
Private_SW(config)#interface range e 0/0-3, e 1/0-3, e 2/0-3, e 3/0-3
Private_SW(config-if-range)#shutdown
Private_SW(config-if-range)#exit
```

2) VLAN 설정

```
Private_SW(config)#vlan 250  
Private_SW(config-vlan)#name Private  
Private_SW(config-vlan)#exit
```

3) VLAN Access Link 설정 및 Port Channel 구성

```
Private_SW(config)#interface range e 0/0-3  
Private_SW(config-if-range)#desc ##Private_Server##  
Private_SW(config-if-range)#switchport mode access  
Private_SW(config-if-range)#switchport access vlan 250  
Private_SW(config-if-range)#spanning-tree portfast  
Private_SW(config-if-range)#no shutdown  
Private_SW(config-if-range)#exit
```

```
Private_SW(config)#interface range e 0/0-1  
Private_SW(config-if-range)#channel-group 3 mode desirable  
Private_SW(config-if-range)#exit  
Private_SW(config)#interface range e 0/2-3  
Private_SW(config-if-range)#channel-group 4 mode desirable  
Private_SW(config-if-range)#exit
```

4) VLAN Trunk Link 설정 및 Port Channel 구성

```
Private_SW(config)#interface range e 1/0-1  
Private_SW(config-if-range)#desc ##DSW1_Uplink_Trunk_Port##  
Private_SW(config-if-range)#switchport trunk encapsulation dot1q  
Private_SW(config-if-range)#switchport trunk allowed vlan 250  
Private_SW(config-if-range)#switchport trunk native vlan 999  
Private_SW(config-if-range)#switchport mode trunk  
Private_SW(config-if-range)#switchport nonegotiate  
Private_SW(config-if-range)#channel-group 1 mode desirable  
Private_SW(config-if-range)#no shutdown  
Private_SW(config-if-range)#exit  
Private_SW(config)#interface range e 1/2-3  
Private_SW(config-if-range)#desc ##DSW2_Uplink_Trunk_Port##  
Private_SW(config-if-range)#switchport trunk encapsulation dot1q  
Private_SW(config-if-range)#switchport trunk allowed vlan 250  
Private_SW(config-if-range)#switchport trunk native vlan 999  
Private_SW(config-if-range)#switchport mode trunk
```

```
Private_SW(config-if-range)#switchport nonegotiate  
Private_SW(config-if-range)#channel-group 2 mode desirable  
Private_SW(config-if-range)#no shutdown  
Private_SW(config)#end  
Private_SW#wr
```

7. DSW1

1) 기본설정

```
DSW1#configure terminal  
DSW1(config)#enable secret kgb3  
DSW1(config)#no ip domain lookup  
DSW1(config)#line console 0  
DSW1(config-line)#logging syncronous  
DSW1(config-line)#exec-time 5 0  
DSW1(config-line)#password kggame123  
DSW1(config-line)#login  
DSW1(config-line)#exit
```

```
DSW1(config)#interface range e 0/0 - 3, e 1/0 - 3, e 2/0 - 3, e 3/0 – 3, e4/0 - 1  
DSW1(config-if-range)#shutdown  
DSW1(config-if-range)#exit
```

2) VLAN 설정

```
DSW1(config)#vlan 10  
DSW1(config-vlan)#name HR  
DSW1(config-vlan)#exit  
DSW1(config)#vlan 20  
DSW1(config-vlan)#name Tech  
DSW1(config-vlan)#exit  
DSW1(config)#vlan 30  
DSW1(config-vlan)#name UI  
DSW1(config-vlan)#exit  
DSW1(config)#vlan 40  
DSW1(config-vlan)#name Ope  
DSW1(config-vlan)#exit  
DSW1(config)#vlan 230  
DSW1(config-vlan)#name DMZ  
DSW1(config-vlan)#exit
```

```
DSW1(config)#vlan 240
DSW1(config-vlan)#name Public
DSW1(config-vlan)#exit
DSW1(config)#vlan 245
DSW1(config-vlan)#name Test
DSW1(config-vlan)#exit
DSW1(config)#vlan 250
DSW1(config-vlan)#name Private
DSW1(config-vlan)#exit
```

3) VLAN Trunk Link 설정 및 Port Channel 구성

```
DSW1(config)#interface range e2/0 – 1
DSW1(config-if-range)#desc ##ASW_HR_Trunk_Port##
DSW1(config-if-range)#switchport trunk encapsulation dot1q
DSW1(config-if-range)#switchport trunk allowed vlan 10, 20, 30, 40, 230, 240,245,250
DSW1(config-if-range)#switchport trunk native vlan 999
DSW1(config-if-range)#switchport mode trunk
DSW1(config-if-range)#switchport nonegotiate
DSW1(config-if-range)#channel-group 1 mode desirable
DSW1(config-if-range)#no shutdown
DSW1(config-if-range)#exit
```

```
DSW1(config)#interface range e2/2 – 3
DSW1(config-if-range)#desc ##ASW_Tech_Trunk_Port##
DSW1(config-if-range)#switchport trunk encapsulation dot1q
DSW1(config-if-range)#switchport trunk allowed vlan 10, 20, 30, 40, 230, 240,245,250
DSW1(config-if-range)#switchport trunk native vlan 999
DSW1(config-if-range)#switchport mode trunk
DSW1(config-if-range)#switchport nonegotiate
DSW1(config-if-range)#channel-group 2 mode desirable
DSW1(config-if-range)#no shutdown
DSW1(config-if-range)#exit
```

```
DSW1(config)#interface range e3/0 – 1
DSW1(config-if-range)#desc ##ASW_UI_Trunk_Port##
DSW1(config-if-range)#switchport trunk encapsulation dot1q
DSW1(config-if-range)#switchport trunk allowed vlan 10, 20, 30, 40, 230, 240,245,250
DSW1(config-if-range)#switchport trunk native vlan 999
DSW1(config-if-range)#switchport mode trunk
DSW1(config-if-range)#switchport nonegotiate
```

```
DSW1(config-if-range)#channel-group 3 mode desirable
DSW1(config-if-range)#no shutdown
DSW1(config-if-range)#exit

DSW1(config)#interface range e3/2 – 3
DSW1(config-if-range)#desc ##ASW_Ope_Trunk_Port##
DSW1(config-if-range)#switchport trunk encapsulation dot1q
DSW1(config-if-range)#switchport trunk allowed vlan 10, 20, 30, 40, 230, 240, 245, 250
DSW1(config-if-range)#switchport trunk native vlan 999
DSW1(config-if-range)#switchport mode trunk
DSW1(config-if-range)#switchport nonegotiate
DSW1(config-if-range)#channel-group 4 mode desirable
DSW1(config-if-range)#no shutdown
DSW1(config-if-range)#exit

DSW1(config)#interface range e0/2 – 3
DSW1(config-if-range)#desc ##DMZ_SW_Trunk_Port##
DSW1(config-if-range)#switchport trunk encapsulation dot1q
DSW1(config-if-range)#switchport trunk allowed vlan 10, 20, 30, 40, 230, 240, 245, 250
DSW1(config-if-range)#switchport trunk native vlan 999
DSW1(config-if-range)#switchport mode trunk
DSW1(config-if-range)#switchport nonegotiate
DSW1(config-if-range)#channel-group 5 mode desirable
DSW1(config-if-range)#no shutdown
DSW1(config-if-range)#exit

DSW1(config)#interface range e1/0 – 1
DSW1(config-if-range)#desc ##Public_SW_Trunk_Port##
DSW1(config-if-range)#switchport trunk encapsulation dot1q
DSW1(config-if-range)#switchport trunk allowed vlan 10, 20, 30, 40, 230, 240, 245, 250
DSW1(config-if-range)#switchport trunk native vlan 999
DSW1(config-if-range)#switchport mode trunk
DSW1(config-if-range)#switchport nonegotiate
DSW1(config-if-range)#channel-group 6 mode desirable
DSW1(config-if-range)#no shutdown
DSW1(config-if-range)#exit

DSW1(config)#interface range e4/0–1
DSW1(config-if-range)#desc ##Test_SW_Trunk_Port##
DSW1(config-if-range)#switchport trunk encapsulation dot1q
DSW1(config-if-range)#switchport trunk allowed vlan 10, 20, 30, 40, 230, 240, 245, 250
```

```
DSW1(config-if-range)#switchport trunk native vlan 999
DSW1(config-if-range)#switchport mode trunk
DSW1(config-if-range)#switchport nonegotiate
DSW1(config-if-range)#channel-group 245 mode desirable
DSW1(config-if-range)#no shutdown
DSW1(config-if-range)#exit
```

```
DSW1(config)#interface range e1/2 – 3
DSW1(config-if-range)#desc ##Private_SW_Trunk_Port##
DSW1(config-if-range)#switchport trunk encapsulation dot1q
DSW1(config-if-range)#switchport trunk allowed vlan 10, 20, 30, 40, 230, 240 , 245, 250
DSW1(config-if-range)#switchport trunk native vlan 999
DSW1(config-if-range)#switchport mode trunk
DSW1(config-if-range)#switchport nonegotiate
DSW1(config-if-range)#channel-group 7 mode desirable
DSW1(config-if-range)#no shutdown
DSW1(config-if-range)#exit
```

4) Inter-VLAN SVI 설정 및 HSRP

```
DSW1(config)#track 1 interface e 0/0 line-protocol
DSW1(config-track)#exit
```

```
DSW1(config)#interface vlan 10
DSW1(config-if)#desc ##VLAN10_Gateway##
DSW1(config-if)#ip add 10.10.10.252 255.255.255.0
DSW1(config-if)#ip helper-address 10.10.250.4
DSW1(config-if)#standby 10 ip 10.10.10.254
DSW1(config-if)#standby 10 priority 110
DSW1(config-if)#standby 10 track 1 decrement 50
DSW1(config-if)#standby 10 preempt delay minimum 30
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

```
DSW1(config)#interface vlan 20
DSW1(config-if)#desc ##VLAN20_Gateway##
DSW1(config-if)#ip add 10.10.20.252 255.255.255.0
DSW1(config-if)#ip helper-address 10.10.250.4
DSW1(config-if)#standby 20 ip 10.10.20.254
DSW1(config-if)#standby 20 priority 110
DSW1(config-if)#standby 20 track 1 decrement 50
```

```
DSW1(config-if)#standby 20 preempt delay minimum 30
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

```
DSW1(config)#interface vlan 30
DSW1(config-if)#desc ##VLAN30_Gateway##
DSW1(config-if)#ip add 10.10.30.252 255.255.255.0
DSW1(config-if)#ip helper-address 10.10.250.4
DSW1(config-if)#standby 30 ip 10.10.30.254
DSW1(config-if)#standby 30 priority 110
DSW1(config-if)#standby 30 track 1 decrement 50
DSW1(config-if)#standby 30 preempt delay minimum 30
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

```
DSW1(config)#interface vlan 40
DSW1(config-if)#desc ##VLAN40_Gateway##
DSW1(config-if)#ip add 10.10.40.252 255.255.255.0
DSW1(config-if)#ip helper-address 10.10.250.4
DSW1(config-if)#standby 40 ip 10.10.40.254
DSW1(config-if)#standby 40 preempt
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

```
DSW1(config)#interface vlan 230
DSW1(config-if)#desc ##VLAN230_Gateway##
DSW1(config-if)#ip add 192.10.10.232 255.255.255.0
DSW1(config-if)#standby 230 ip 192.10.10.234
DSW1(config-if)#standby 230 priority 110
DSW1(config-if)#standby 230 track 1 decrement 50
DSW1(config-if)#standby 230 preempt delay minimum 30
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

```
DSW1(config)#interface vlan 240
DSW1(config-if)#desc ##VLAN240_Gateway##
DSW1(config-if)#ip add 192.10.10.242 255.255.255.0
DSW1(config-if)#standby 240 ip 192.10.10.244
DSW1(config-if)#standby 240 preempt
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

```
DSW1(config)#interface vlan 245
DSW1(config-if)#desc ##VLAN245_Gateway##
DSW1(config-if)#ip add 192.10.10.252 255.255.255.0
DSW1(config-if)#standby 245 ip 192.10.10.254
DSW1(config-if)#standby 245 preempt
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

```
DSW1(config)#interface vlan 250
DSW1(config-if)#desc ##VLAN250_Gateway##
DSW1(config-if)#ip add 10.10.250.252 255.255.255.0
DSW1(config-if)#standby 250 ip 10.10.250.254
DSW1(config-if)#standby 250 preempt
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

5) Connection SVI 설정

▶ Router Connection

```
DSW1(config)#interface e 0/0
DSW1(config-if)#desc ##CE_Connection##
DSW1(config-if)#no switchport
DSW1(config-if)#ip add 10.10.100.2 255.255.255.252
DSW1(config-if)#duplex full
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

▶ DSW2 Connection

```
DSW1(config)#interface e 0/1
DSW1(config-if)#desc ##DSW2_Connetion##
DSW1(config-if)#no switchport
DSW1(config-if)#ip add 10.10.100.9 255.255.255.252
DSW1(config-if)#no shutdown
DSW1(config-if)#exit
```

6) RSTP 설정

```
DSW1(config)#spanning-tree vlan 10 priority 4096
DSW1(config)#spanning-tree vlan 20 priority 4096
DSW1(config)#spanning-tree vlan 30 priority 4096
DSW1(config)#spanning-tree vlan 230 priority 4096
```

7) Routing 구간 RIP 설정

```
DSW1(config)#router rip
DSW1(config-router)#version 2
DSW1(config-router)#no auto-summary
DSW1(config-router)#network 10.0.0.0
DSW1(config-router)#network 192.10.10.0
DSW1(config-router)#exit
DSW1(config)#no ip cef
DSW1(config)#exit
DSW1#wr
```

8. DSW2

1) 기본설정

```
IOU>enable
IOU#configure terminal
IOU(config)#hostname DSW2
DSW2(config)#no ip domain lookup
DSW2(config)#enable secret kgb3
DSW2(config)#line console 0
DSW2(config-line)#exec-timeout 5 0
DSW2(config-line)#logging synchronous
DSW2(config-line)#password kggame123
DSW2(config-line)#login
DSW2(config-line)#exit

DSW2(config)#interface range e0/0-3, e1/0-3, e2/0-3, e3/0-3, e4/0-1
DSW2(config-if-range)#shutdown
DSW2(config-if-range)#exit
```

2) VLAN 설정

```
DSW2(config)#vlan 10
DSW2(config-vlan)#name HR
DSW2(config-vlan)#exit
DSW1(config-vlan)#exit
DSW2(config)#vlan 20
DSW2(config-vlan)#name Tech
DSW2(config-vlan)#exit
DSW2(config)#vlan 30
DSW2(config-vlan)#name UI
```

```
DSW2(config-vlan)#exit
DSW2(config)#vlan 40
DSW2(config-vlan)#name Ope
DSW2(config-vlan)#exit
DSW2(config)#vlan 230
DSW2(config-vlan)#name DMZ
DSW2(config-vlan)#exit
DSW2(config)#vlan 240
DSW2(config-vlan)#name Public
DSW2(config-vlan)#exit
DSW2(config)#vlan 245
DSW2(config-vlan)#name Test
DSW2(config-vlan)#exit
DSW2(config)#vlan 250
DSW2(config-vlan)#name Private
DSW2(config-vlan)#exit
```

3) VLAN Trunk Link 설정 및 Port Channel 구성

```
DSW2(config)#interface range e2/0-1
DSW2(config-if-range)#desc ##ASW_HR_Trunk_Port##
DSW2(config-if-range)#switchport trunk encapsulation dot1q
DSW2(config-if-range)#switchport mode trunk
DSW2(config-if-range)#switchport trunk allowed vlan 10,20,30,40,230,240,245,250
DSW2(config-if-range)#switchport trunk native vlan 999
DSW2(config-if-range)#switchport nonegotiate
DSW2(config-if-range)#channel-group 1 mode desirable
DSW2(config-if-range)#no shutdown
DSW2(config-if-range)#exit
```

```
DSW2(config)#interface range e2/0-1
DSW2(config-if-range)#desc ##ASW_Tech_Trunk_Port##
DSW2(config-if-range)#switchport trunk encapsulation dot1q
DSW2(config-if-range)#switchport mode trunk
DSW2(config-if-range)#switchport trunk allowed vlan 10,20,30,40,230,240,245,250
DSW2(config-if-range)#switchport trunk native vlan 999
DSW2(config-if-range)#switchport nonegotiate
DSW2(config-if-range)#channel-group 2 mode desirable
DSW2(config-if-range)#no shutdown
DSW2(config-if-range)#exit
```

```
DSW2(config)#interface range e3/0-1
DSW2(config-if-range)#desc ##ASW_UI_Trunk_Port##
DSW2(config-if-range)#switchport trunk encapsulation dot1q
DSW2(config-if-range)#switchport mode trunk
DSW2(config-if-range)#switchport trunk allowed vlan 10,20,30,40,230,240,245,250
DSW2(config-if-range)#switchport trunk native vlan 999
DSW2(config-if-range)#switchport nonegotiate
DSW2(config-if-range)#channel-group 3 mode desirable
DSW2(config-if-range)#no shutdown
DSW2(config-if-range)#exit
```

```
DSW2(config)#interface range e3/2-3
DSW2(config-if-range)#desc ##ASW_Ope_Trunk_Port##
DSW2(config-if-range)#switchport trunk encapsulation dot1q
DSW2(config-if-range)#switchport mode trunk
DSW2(config-if-range)#switchport trunk allowed vlan 10,20,30,40,230,240,245,250
DSW2(config-if-range)#switchport trunk native vlan 999
DSW2(config-if-range)#switchport nonegotiate
DSW2(config-if-range)#channel-group 4 mode desirable
DSW2(config-if-range)#no shutdown
DSW2(config-if-range)#exit
```

```
DSW2(config)#interface range e0/2-3
DSW2(config-if-range)#desc ##DMZ_SW_Trunk_Port##
DSW2(config-if-range)#switchport trunk encapsulation dot1q
DSW2(config-if-range)#switchport mode trunk
DSW2(config-if-range)#switchport trunk allowed vlan 10,20,30,40,230,240,245,250
DSW2(config-if-range)#switchport trunk native vlan 999
DSW2(config-if-range)#switchport nonegotiate
DSW2(config-if-range)#channel-group 230 mode desirable
DSW2(config-if-range)#no shutdown
DSW2(config-if-range)#exit
```

```
DSW2(config)#interface range e1/0-1
DSW2(config-if-range)#desc ##Publice_SW_Trunk_Port##
DSW2(config-if-range)#switchport trunk encapsulation dot1q
DSW2(config-if-range)#switchport mode trunk
DSW2(config-if-range)#switchport trunk allowed vlan 10,20,30,40,230,240,245,250
DSW2(config-if-range)#switchport trunk native vlan 999
DSW2(config-if-range)#switchport nonegotiate
DSW2(config-if-range)#channel-group 240 mode desirable
```

```

DSW2(config-if-range)#no shutdown
DSW2(config-if-range)#exit

DSW2(config)#interface range e4/0-1
DSW2(config-if-range)#desc ##Test_SW_Trunk_Port##
DSW2(config-if-range)#switchport trunk encapsulation dot1q
DSW2(config-if-range)#switchport mode trunk
DSW2(config-if-range)#switchport trunk allowed vlan 10, 20, 30, 40, 230, 240, 245, 250
DSW2(config-if-range)#switchport trunk native vlan 999
DSW2(config-if-range)#switchport nonegotiate
DSW2(config-if-range)#channel-group 245 mode desirable
DSW2(config-if-range)#no shutdown
DSW2(config-if-range)#exit

DSW2(config)#interface range e1/2-3
DSW2(config-if-range)#desc ##Private_SW_Trunk_Port##
DSW2(config-if-range)#switchport trunk encapsulation dot1q
DSW2(config-if-range)#switchport mode trunk
DSW2(config-if-range)#switchport trunk allowed vlan 10,20,30,40,230,240,245,250
DSW2(config-if-range)#switchport trunk native vlan 999
DSW2(config-if-range)#switchport nonegotiate
DSW2(config-if-range)#channel-group 250 mode desirable
DSW2(config-if-range)#no shutdown
DSW2(config-if-range)#exit

```

4) Inter-VLAN SVI 설정 및 HSRP

```

DSW2(config)#track 1 interface e0/0 line-protocol
DSW2(config-track)#exit

DSW2(config)#interface vlan 40
DSW2(config-if)#desc ##VLAN40_Gateway##
DSW2(config-if)#ip add 10.10.40.253 255.255.255.0
DSW2(config-if)#ip helper-address 10.10.250.5
DSW2(config-if)#standby 40 ip 10.10.40.254
DSW2(config-if)#standby 40 priority 110
DSW2(config-if)#standby 40 track 1 decrement 50
DSW2(config-if)#standby 40 preempt delay minimum 30
DSW2(config-if)#no shutdown
DSW2(config-if)#exit

```

```
DSW2(config)#interface vlan 240
DSW2(config-if)#desc ##VLAN240_Gateway##
DSW2(config-if)#ip add 192.10.10.243 255.255.255.0
DSW2(config-if)#standby 240 ip 192.10.10.244
DSW2(config-if)#standby 240 priority 110
DSW2(config-if)#standby 240 track 1 decrement 50
DSW2(config-if)#standby 240 preempt delay minimum 30
DSW2(config-if)#no shutdown
DSW2(config-if)#exit
```

```
DSW2(config)#interface vlan 245
DSW2(config-if)#desc ##VLAN245_Gateway##
DSW2(config-if)#ip add 192.10.10.253 255.255.255.0
DSW2(config-if)#standby 240 ip 10.10.245.254
DSW2(config-if)#standby 240 priority 110
DSW2(config-if)#standby 240 track 1 decrement 50
DSW2(config-if)#standby 240 preempt delay minimum 30
DSW2(config-if)#no shutdown
DSW2(config-if)#exit
```

```
DSW2(config)#interface vlan 250
DSW2(config-if)#desc ##VLAN250_Gateway##
DSW2(config-if)#ip add 10.10.250.253 255.255.255.0
DSW2(config-if)#standby 250 ip 10.10.250.254
DSW2(config-if)#standby 250 priority 110
DSW2(config-if)#standby 250 track 1 decrement 50
DSW2(config-if)#standby 250 preempt delay minimum 30
DSW2(config-if)#no shutdown
DSW2(config-if)#exit
```

```
DSW2(config)#interface vlan 10
DSW2(config-if)#desc ##VLAN10_Gateway##
DSW2(config-if)#ip add 10.10.10.253 255.255.255.0
DSW2(config-if)#ip helper-address 10.10.250.5
DSW2(config-if)#standby 10 ip 10.10.10.254
DSW2(config-if)#standby 10 preempt
DSW2(config-if)#no shutdown
DSW2(config-if)#exit
```

```
DSW2(config)#interface vlan 20
DSW2(config-if)#desc ##VLAN20_Gateway##
```

```
DSW2(config-if)#ip add 10.10.20.253 255.255.255.0
DSW2(config-if)#ip helper-address 10.10.250.5
DSW2(config-if)#standby 20 ip 10.10.20.254
DSW2(config-if)#standby 20 preempt
DSW2(config-if)#no shutdown
DSW2(config-if)#exit
```

```
DSW2(config)#interface vlan 30
DSW2(config-if)#desc ##VLAN30_Gateway##
DSW2(config-if)#ip add 10.10.30.253 255.255.255.0
DSW2(config-if)#ip helper-address 10.10.250.5
DSW2(config-if)#standby 30 ip 10.10.30.254
DSW2(config-if)#standby 30 preempt
DSW2(config-if)#no shutdown
DSW2(config-if)#exit
```

```
DSW2(config)#interface vlan 230
DSW2(config-if)#desc ##VLAN230_Gateway##
DSW2(config-if)#ip add 192.10.10.233 255.255.255.0
DSW2(config-if)#standby 230 ip 192.10.10.234
DSW2(config-if)#standby 230 preempt
DSW2(config-if)#no shutdown
DSW2(config-if)#exit
```

5) Connection SVI 설정

▶ Router Connection

```
DSW2(config)#interface e0/0
DSW2(config-if)#desc ##CE_Connection##
DSW2(config-if)#no switchport
DSW2(config-if)#ip add 10.10.100.6 255.255.255.252
DSW2(config-if)#duplex full
DSW2(config-if)#no shutdown
DSW2(config-if)#exit
```

▶ DSW1 Connection

```
DSW2(config)#interface e0/1
DSW2(config-if)#desc ##DSW1_Connection##
DSW2(config-if)#no switchport
DSW2(config-if)#ip add 10.10.100.10 255.255.255.252
DSW2(config-if)#no shutdown
DSW2(config-if)#exit
```

6) RSTP 설정

```
DSW2(config)#spanning-tree vlan 40 priority 4096  
DSW2(config)#spanning-tree vlan 240 priority 4096  
DSW2(config)#spanning-tree vlan 245 priority 4096  
DSW2(config)#spanning-tree vlan 250 priority 4096
```

7) Routing 구간 RIP 설정

```
DSW2(config)#router rip  
DSW2(config-router)#version 2  
DSW2(config-router)#no auto-summary  
DSW2(config-router)#network 10.0.0.0  
DSW2(config-router)#network 192.10.10.0  
DSW2(config-router)#exit  
DSW2(config)#no ip cef  
DSW2(config)#end  
DSW2#wr
```

9. CE

1) 기본설정

```
R1#configure terminal  
R1(config)#hostname CE  
CE(config)#no ip domain lookup  
CE(config)#enable secret kgb3  
CE(config)#line console 0  
CE(config-line)#exec-timeout 5 0  
CE(config-line)#logging synchronous  
CE(config-line)#password kggame123  
CE(config-line)#login  
CE(config-line)#exit
```

2) interface 설정

▶ DSW Connection

```
CE(config)#interface f0/0  
CE(config-if)#desc ##DSW1_Connection##  
CE(config-if)#ip add 10.10.100.1 255.255.255.252  
CE(config-if)#duplex full  
CE(config-if)#no shutdown
```

```
CE(config-if)#exit
```

▶ ISP Connection

```
CE(config)#interface f1/0
CE(config-if)#desc ##ISP_Connection##
CE(config-if)#ip add dhcp
CE(config-if)#no shutdown
CE(config-if)#exit
```

3) Routing RIP 설정

```
CE(config)#router rip
CE(config-router)#version 2
CE(config-router)#no auto-summary
CE(config-router)#network 10.0.0.0
CE(config-router)#default-information originate
CE(config-router)#exit
CE(config)#no ip cef
```

4) NAT 설정

▶ VLAN 10, 20, 30, 40

```
CE(config)#ip nat pool HR 192.10.10.1 192.10.10.25 netmask 255.255.255.0
CE(config)#access-list 10 permit 10.10.10.0 0.0.0.255
CE(config)#ip nat inside source list 10 pool HR overload
CE(config)#ip nat pool Tech 192.10.10.26 192.10.10.50 netmask 255.255.255.0
CE(config)#access-list 20 permit 10.10.20.0 0.0.0.255
CE(config)#ip nat inside source list 20 pool Tech overload
CE(config)#ip nat pool UI 192.10.10.51 192.10.10.75 netmask 255.255.255.0
CE(config)#access-list 30 permit 10.10.30.0 0.0.0.255
CE(config)#ip nat inside source list 30 pool UI overload
CE(config)#ip nat pool Ope 192.10.10.76 192.10.10.99 netmask 255.255.255.0
CE(config)#access-list 40 permit 10.10.40.0 0.0.0.255
CE(config)#ip nat inside source list 40 pool Ope overload
```

▶ VPN

```
CE(config)#ip nat inside source static 10.10.250.6 192.10.10.100
```

▶ NAT Interface 적용

```
CE(config)#interface f0/0
CE(config-if)#ip nat inside
CE(config-if)#exit
CE(config)#interface f0/1
CE(config-if)#ip nat inside
CE(config-if)#exit
CE(config)#interface f1/0
CE(config-if)#ip nat outside
CE(config-if)#exit
```

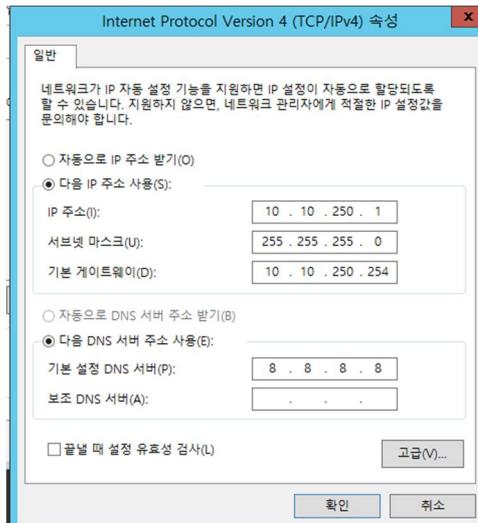
5) ACL 설정

```
CE(config)#access-list 100 deny ip any 10.10.250.0 0.0.0.255
CE(config)#access-list 100 permit ip any any
CE(config)#interface f1/0
CE(config-if)#ip access-group 100 in
CE(config)#end
CE#wr
```

IV 사내 IT 인프라

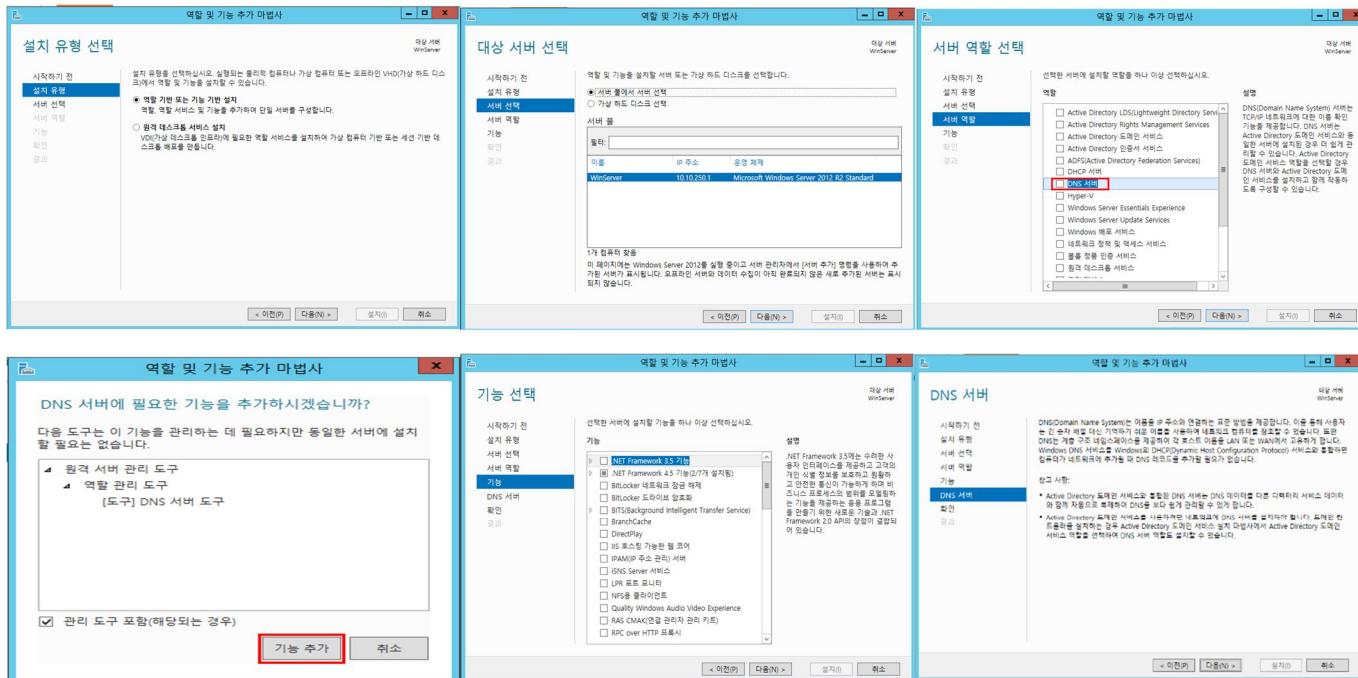
1. DNS

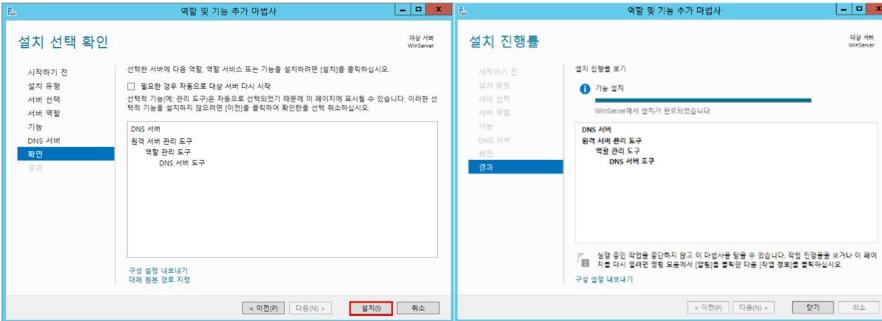
1) 기본 설정



- ▶ 실행창 > ncpa.cpl 로 들어간 후 IP 주소를 설정한다.

2) DNS 서버 설치





▶ DNS 서비스를 구성하기 위해 '서버관리자'로 들어간 후 DNS 서버를 설치한다.

3) DNS 설정

Server Manager - Dashboard

DNS Manager

New Zone Wizard

- 1 이 로컬 서버 구성
- 2 역할 및 기능 추가
- 3 관리할 다른 서버 추가
- 4 서비스 그룹 만들기

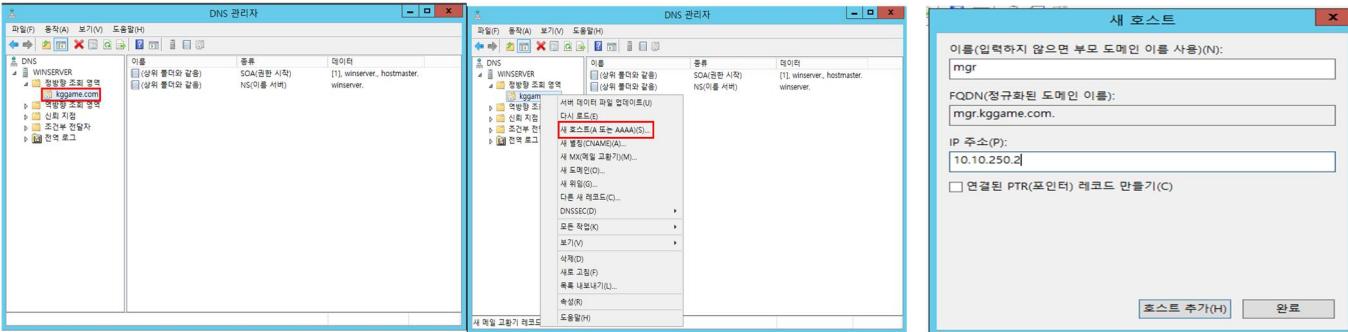
Zone Creation Wizard

- 1 새 영역 시작
- 2 영역 형식
- 3 영역 이름
- 4 새 영역 완료

Zone Creation Wizard Step 5 of 6

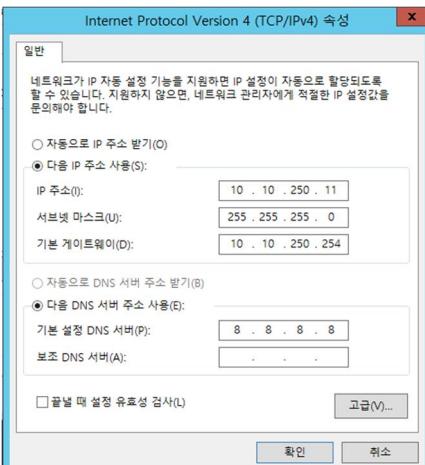
Zone Creation Wizard Step 6 of 6

▶ 주 영역으로 kggame.com 이라는 도메인을 생성한다.

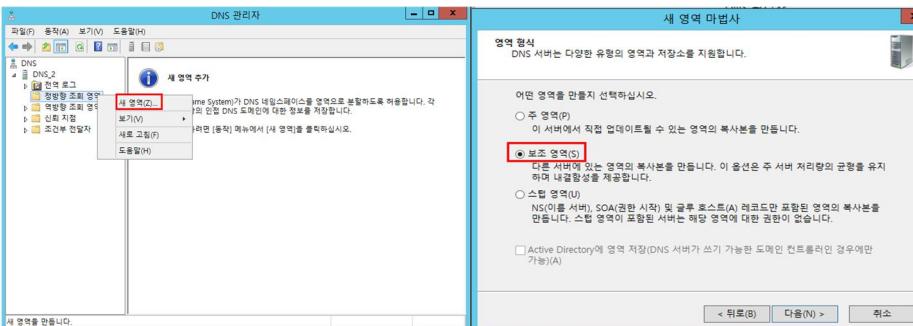


▶ 정방향 조회 영역에 mgr.kggame.com 도메인을 등록해준다.

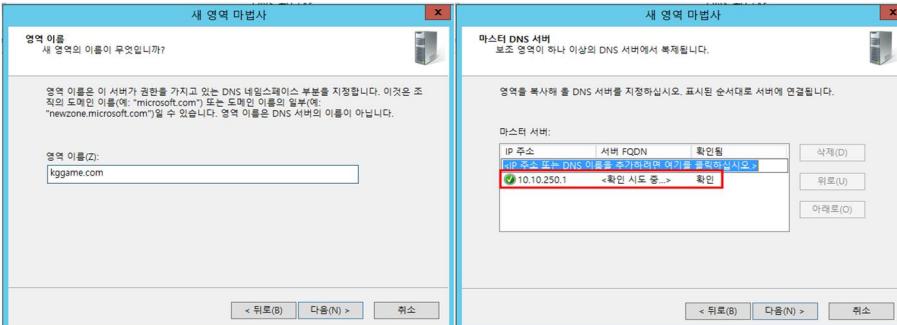
4) DNS 보조영역 구성



▶ 서버의 IP 주소를 설정한다.

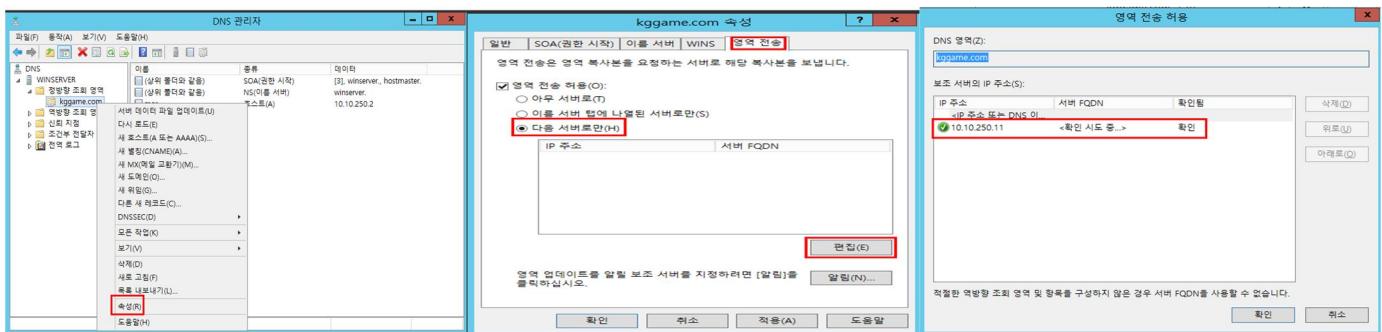


▶ 새 영역을 생성할 때 주 영역이 아닌 보조 영역을 선택하여 생성한다.

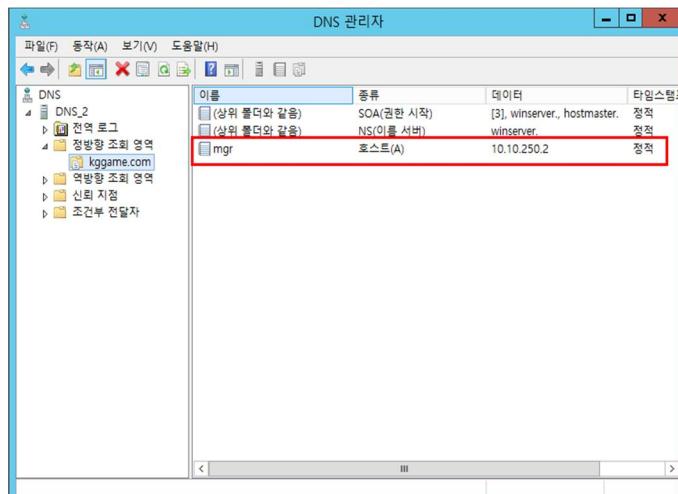


▶ 영역을 불러올 주 영역 서버의 IP 주소를 입력해준다.

5) DNS 서버 이중화



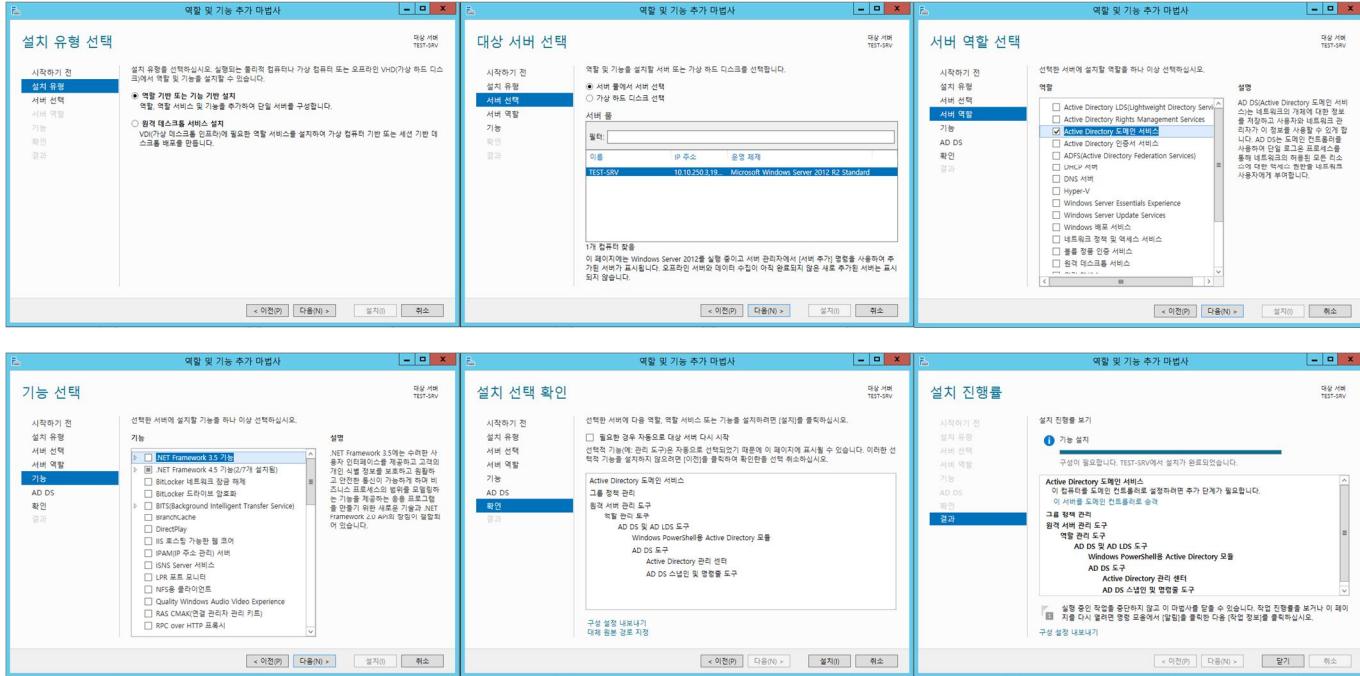
▶ 주 영역 서버에서 DNS 관리자를 열고 도메인 속성에서 보조 영역의 IP 주소를 입력해준다.



▶ 설정이 끝난 후 보조 서버에서 주 영역의 정보가 잘 등록되어 있는 것을 확인한다.

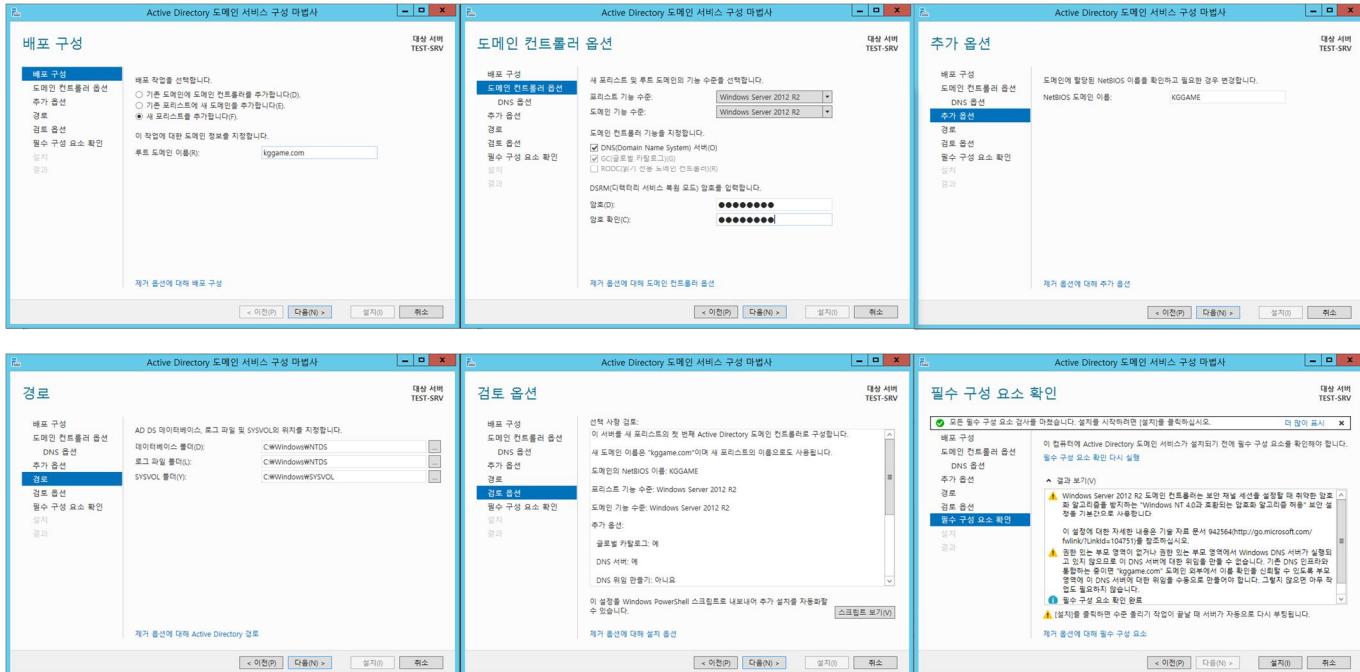
2. AD

1) Active Directory 서비스 설치



▶ 역할 및 기능 추가 > 서버 선택 > 서버 역할 : Active Directory 도메인 서비스 선택 > 설치

2) Domain Controller 구성



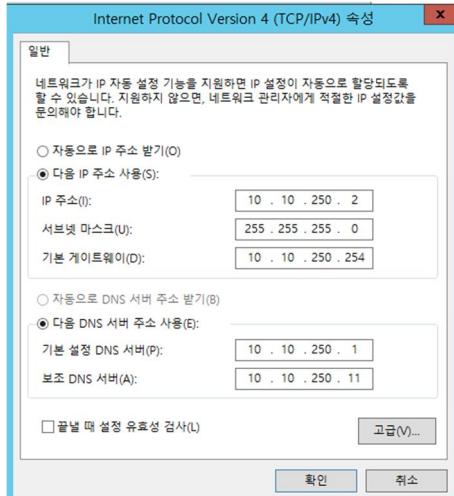
▶ 이 서버를 도메인 컨트롤러로 승격 > 새 포리스트 추가 선택 / 루트 도메인 이름 : kggame.com

> 포리스트, 도메인 기능 수준 : Windows Server 2012 R2 > DSRM 암호 입력

> NetBIOS 도메인 이름 : KGGAME > 선택 사항 검토 > 필수 구성 요소 확인 > 설치

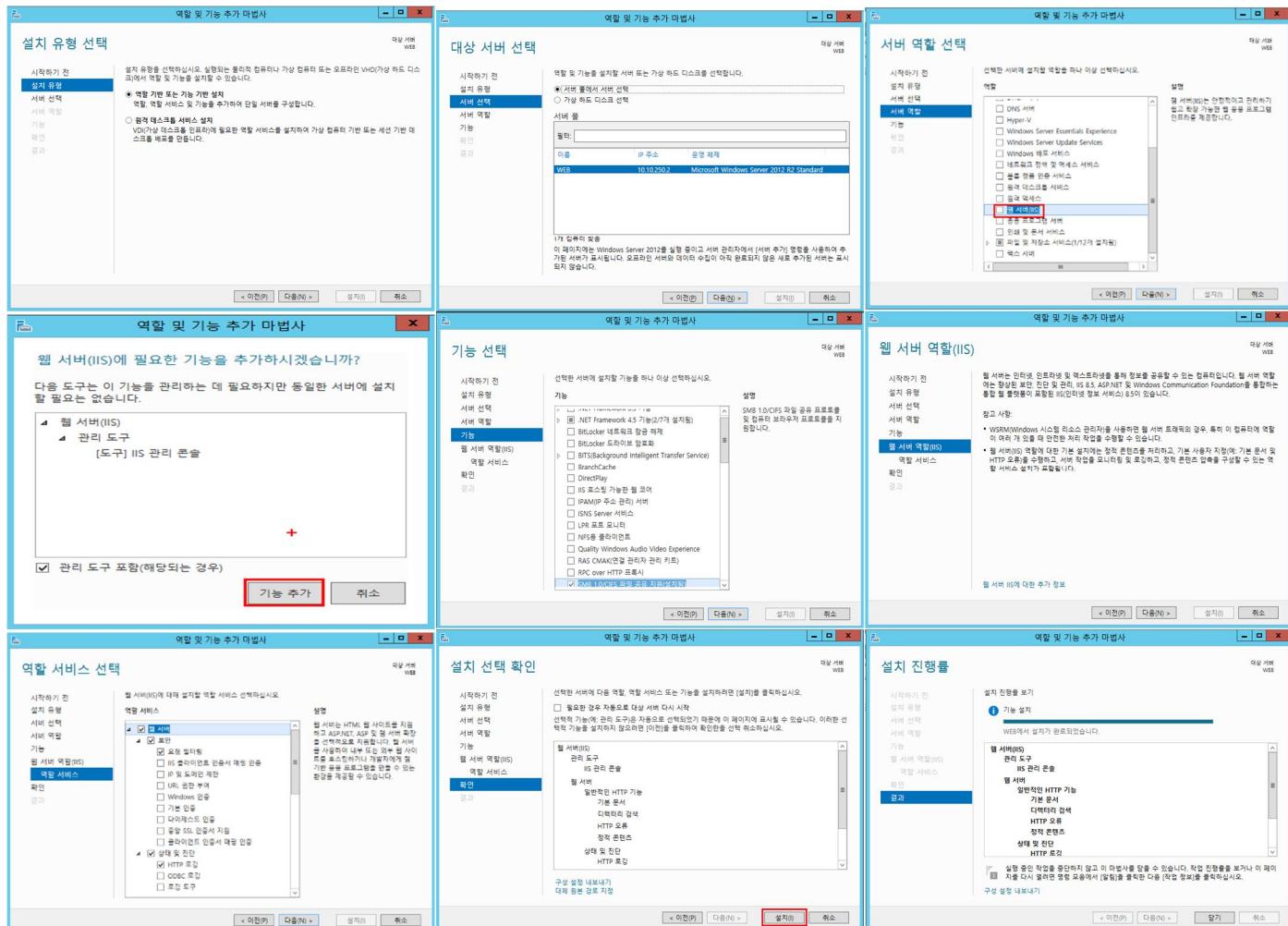
3. WEB

1) 기본 설정



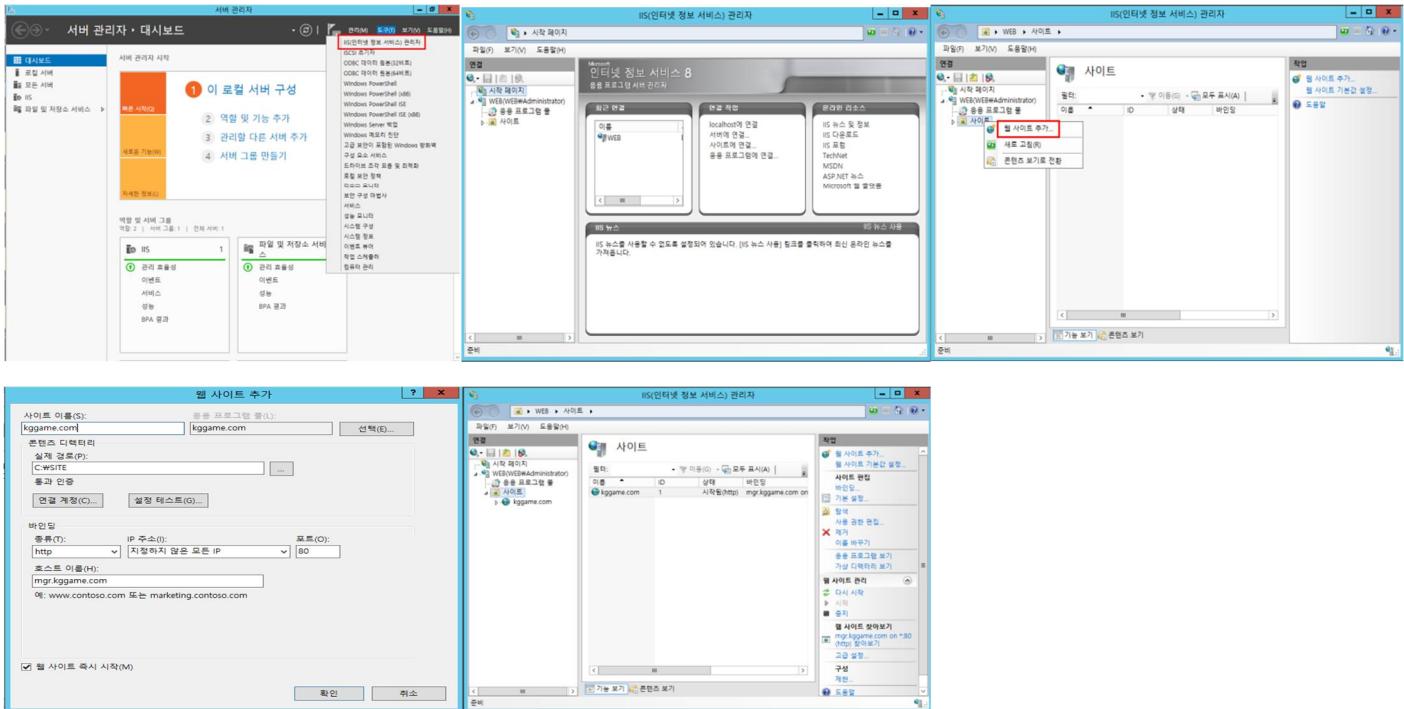
▶ 서버의 IP 주소를 설정한다.

2) IIS(웹 서버) 설치



▶ 웹 서비스를 구성하기 위해 웹 서버 IIS를 설치한다

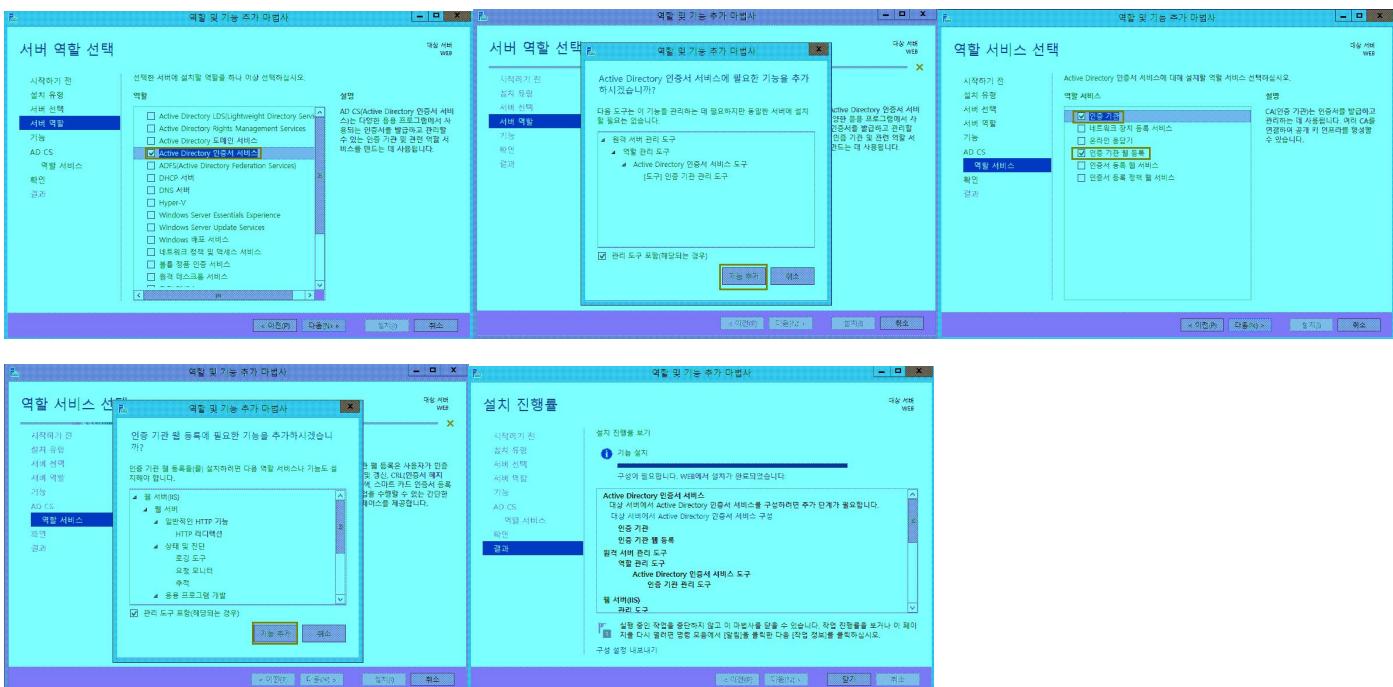
3) IIS 설정



▶ 웹 페이지가 저장 될 폴더를 만든 후 ,

IIS 관리자에서 사이트 이름 / 홈페이지 경로 / 호스트 이름을 입력한다.

4) Active Directory 인증서 서비스 구성



▶ SSL 인증서 적용을 위해 Active Directory 인증서 서비스를 설치한다.

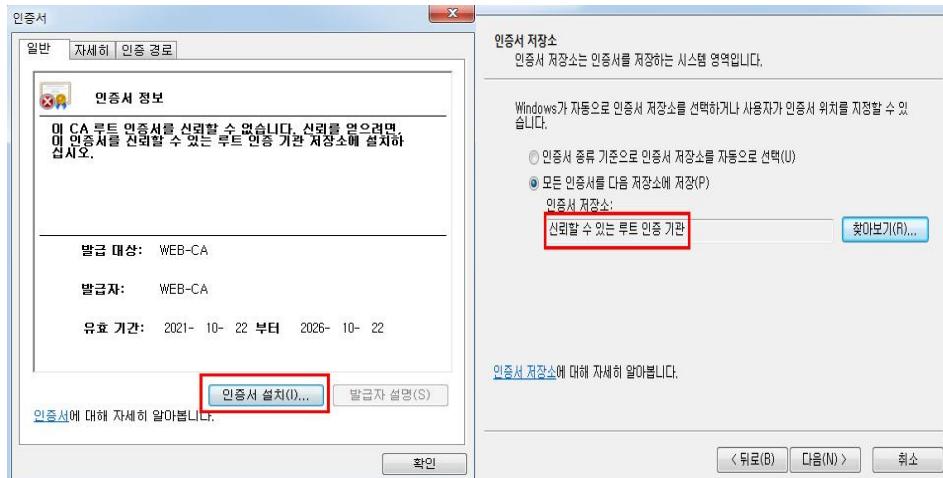
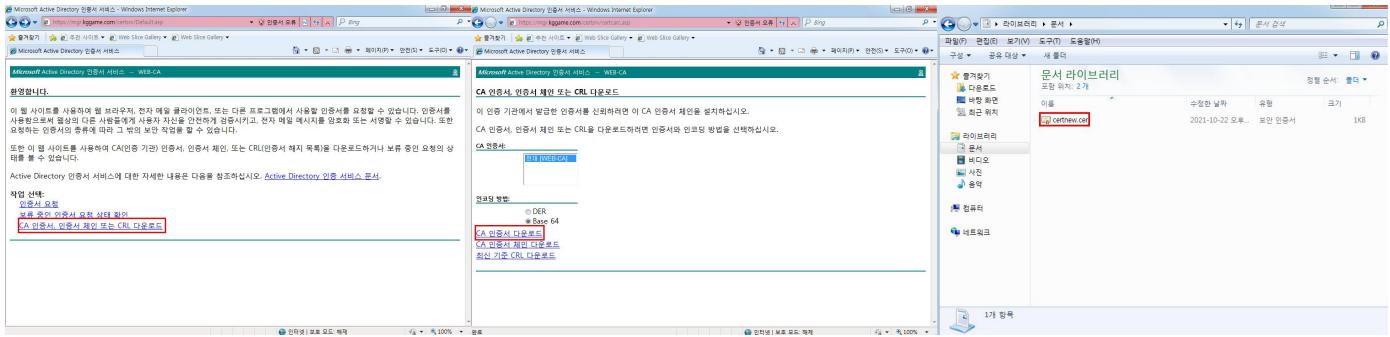
The image shows a collection of ten overlapping windows from a Windows Server 2012 Active Directory (AD CS) environment. The windows are arranged in a grid-like fashion, each displaying different administrative tools and configurations. 1. Top Left: '설치 진행률' (Installation Progress) - Shows the progress of installing Active Directory Certificate Services. 2. Top Middle: 'Active Directory 인증서 서비스' (Active Directory Certificate Services) - A detailed configuration window for the Active Directory Certificate Services role service. 3. Top Right: 'AD CS 구성' (AD CS Configuration) - A general configuration window for AD CS. 4. Second Row Left: 'CA 종류' (CA Type) - A configuration window for the CA type, showing options like 'PKI' and 'PKI+EV'. 5. Second Row Middle: '개인 키' (Personal Key) - A configuration window for personal keys, showing key types like RSA and ECC. 6. Second Row Right: 'AD CS 구성' (AD CS Configuration) - Another configuration window for AD CS, likely related to certificate enrollment. 7. Third Row Left: 'CA 이름' (CA Name) - A configuration window for the CA name, showing fields for common name (CN=WEB-CA) and organizational unit (OU=EV). 8. Third Row Middle: '유 효 기간' (Validity Period) - A configuration window for certificate validity periods, showing a range from 2016-10-21 to 2019-03-00. 9. Third Row Right: 'AD CS 구성' (AD CS Configuration) - A third configuration window for AD CS, possibly for certificate enrollment. 10. Bottom Left: '확인' (Checklist) - A checklist window for ensuring prerequisites are met before installing AD CS. 11. Bottom Middle: '결과' (Results) - A results window showing successful installations of various components. 12. Bottom Right: 'AD CS 구성' (AD CS Configuration) - A fourth configuration window for AD CS, likely for certificate enrollment.

▶ AD 인증서 서비스를 구성한다.

The image consists of three side-by-side screenshots of the Microsoft Internet Information Services (IIS) Manager. The left screenshot shows the 'Sites' section with a site named 'lggame.com'. The middle screenshot shows the 'Bindings' section for the same site, where a new binding for 'https' is being added. The right screenshot shows the 'SSL Settings' dialog box for the 'lggame.com' site, where the 'Bind to' dropdown is set to 'WEB-CA'.

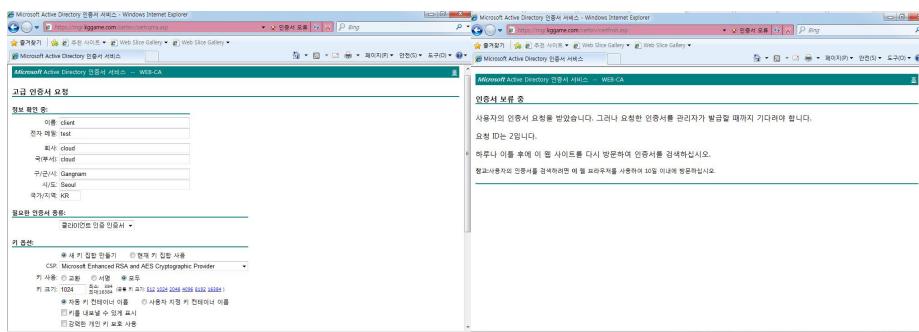
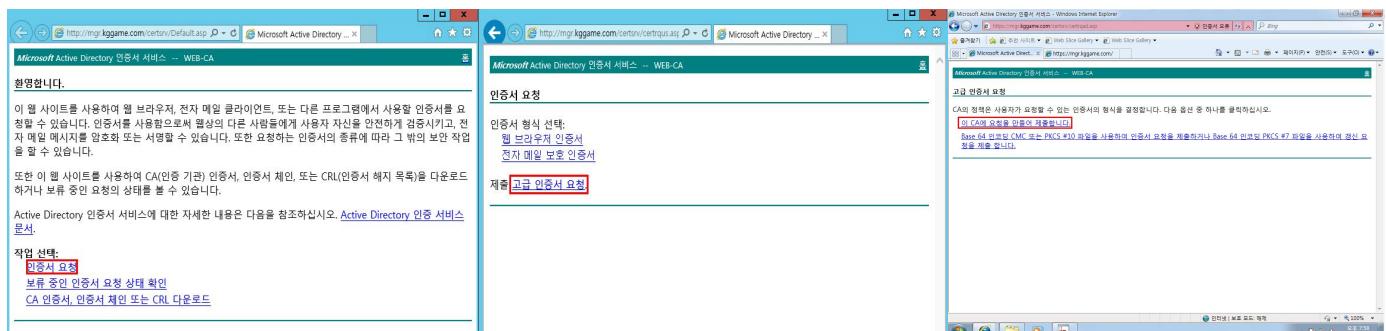
- ▶ IIS 관리자에서 https로 접속하기 위해 바인딩 해준다.

Client 작업



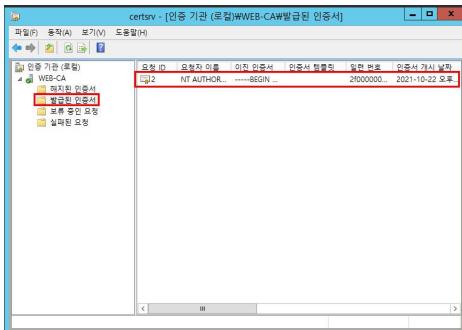
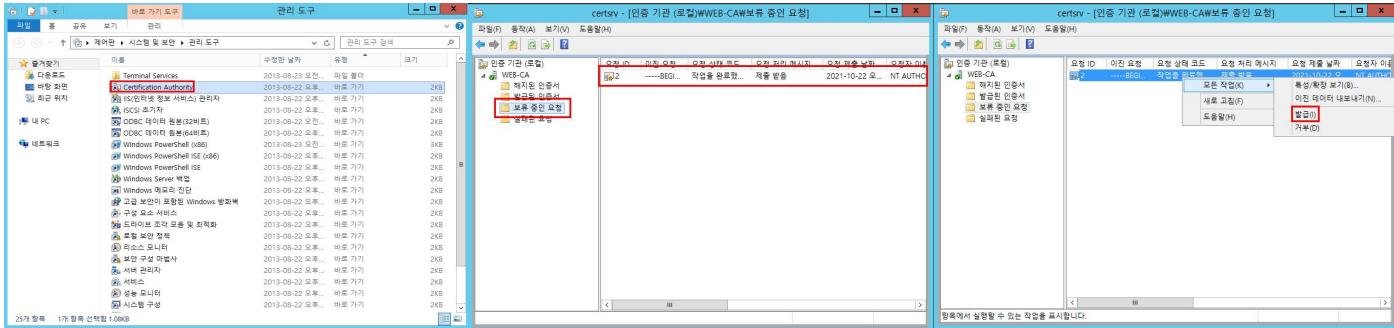
▶ Client 웹브라우저에서 <https://웹서버 IP/certsrv>로 접속한다.

그 다음 CA 인증서를 다운로드 받는다.



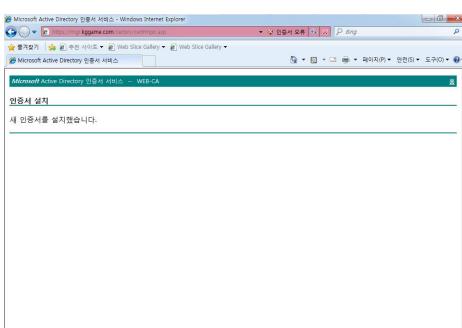
▶ 인증서를 인증 기관(CA)에 요청한다.

WEB 서버(CA)

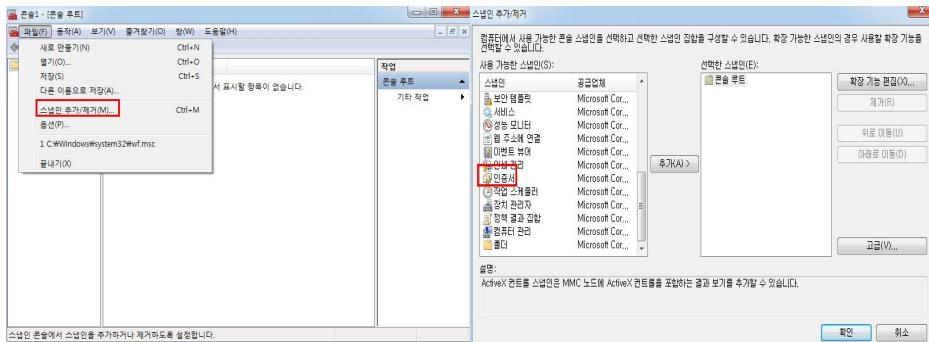


▶ Client에서 요청한 인증서를 발급해준다.

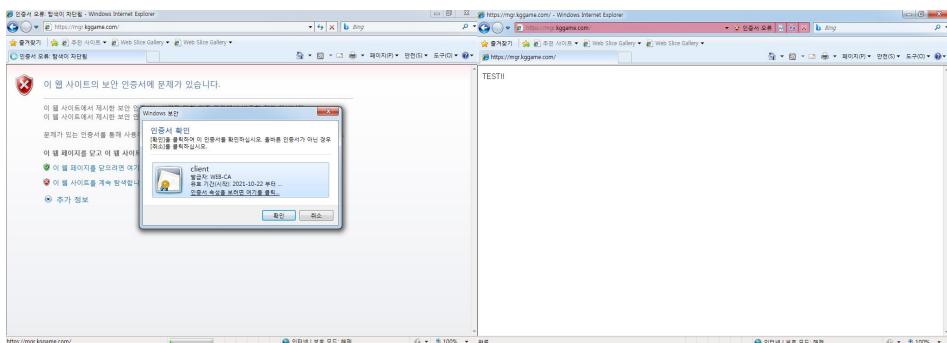
Client 작업



▶ CA로부터 발급받은 인증서를 설치한다.



▶ 실행창 > mmc 로 들어가서 인증서 스냅인을 추가한다.

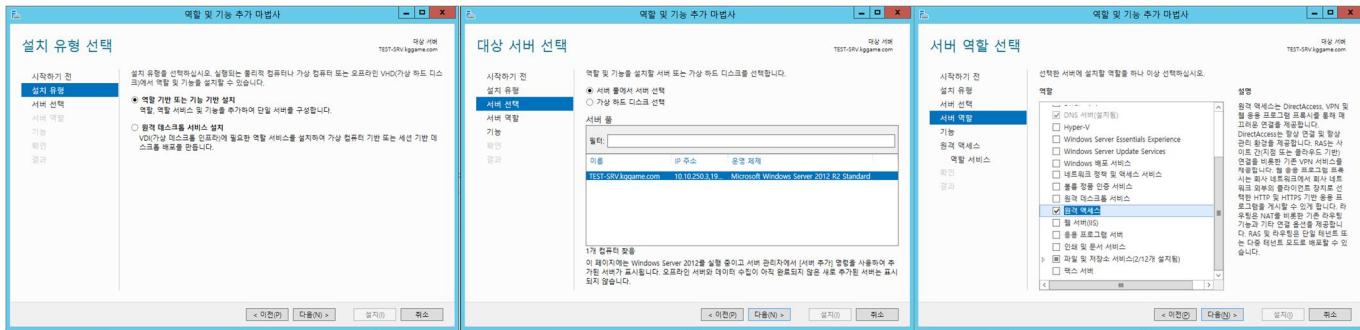


▶ <https://mgr.kggame.com> 으로 접속 시 인증서 확인 창이 뜨는 것을 확인한다.

확인 버튼을 클릭하면 테스트 페이지로 접속되는 것을 확인한다.

4. VPN

1) VPN 서버 설치

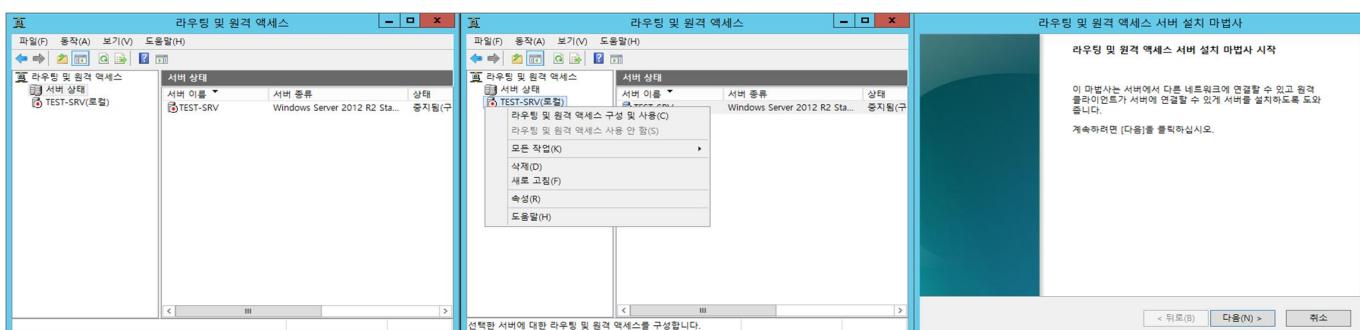


▶ 역할 및 기능 추가 > 서버 선택 > 서버 역할 : 원격 액세스 선택

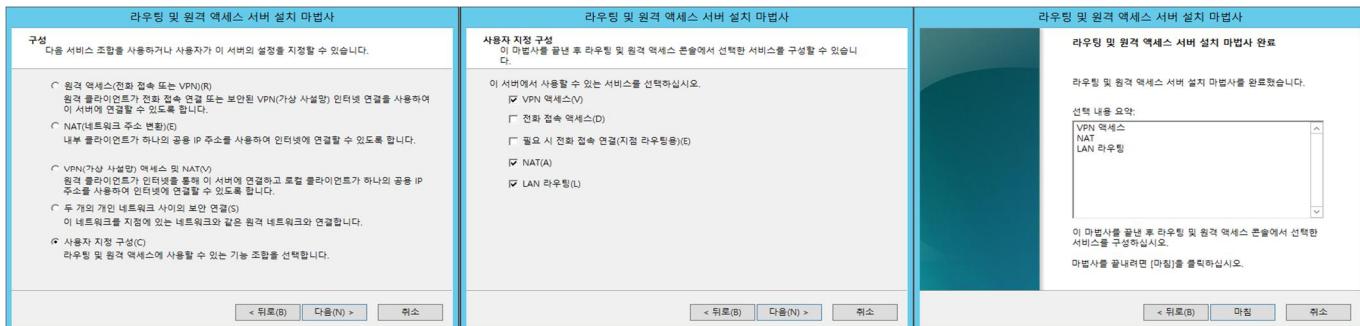


▶ 역할 서비스 : DirectAccess 및 VPN(RAS), 라우팅 선택 > 설치 선택 확인 > 설치

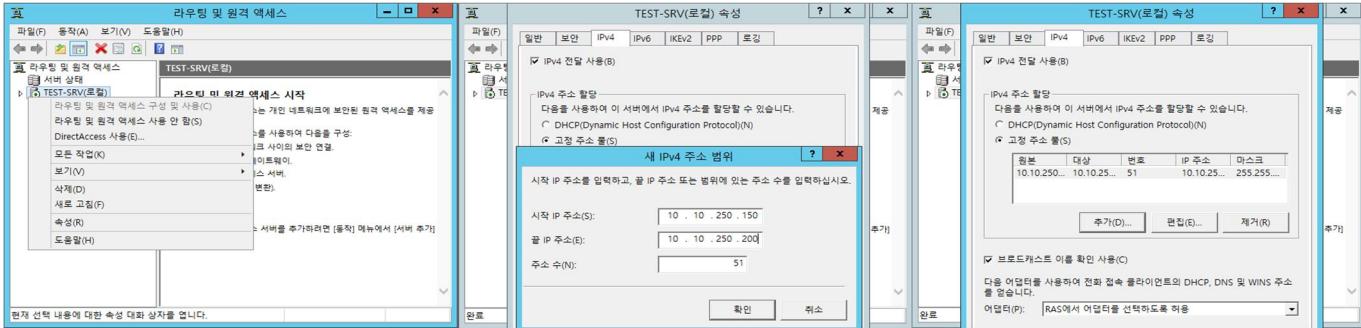
2) VPN 설정 (L2TP)



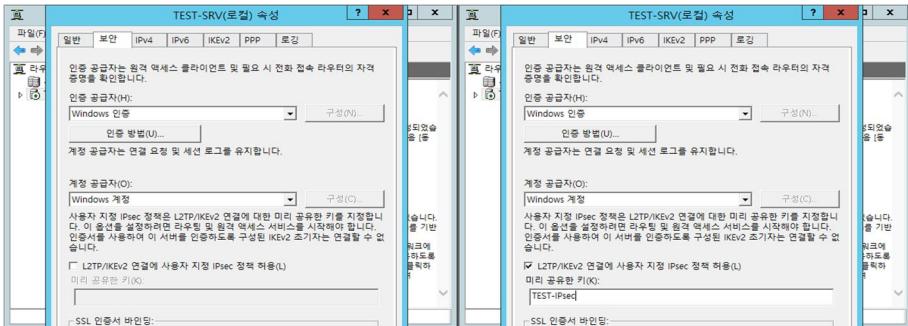
▶ rrasmgmt.msc (라우팅 및 원격 액세스) > 서버 우클릭 > 라우팅 및 원격 액세스 구성 및 사용 선택



▶ 사용자 지정 구성 선택 > VPN 액세스, NAT, LAN 라우팅 선택 > 마침

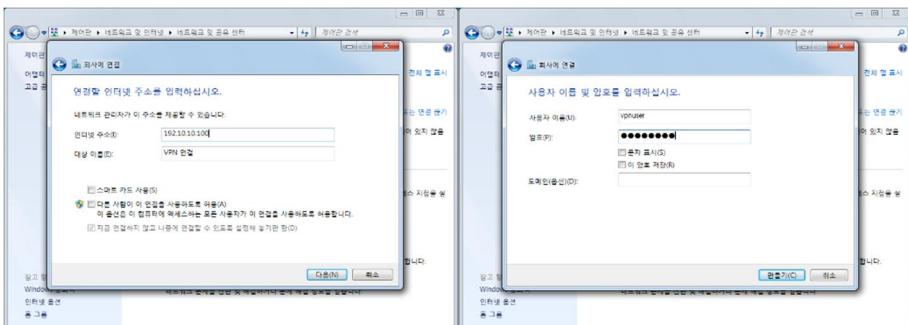


▶ rrasmgmt.msc (라우팅 및 원격 액세스) > 서버 우클릭 > 속성 > IPv4 탭 > 고정 주소 풀 추가(사설 IP)



▶ 보안 탭 > L2TP/IKEv2 연결에 사용자 지정 IPsec 정책 허용 선택 > 미리 공유한 키 : TEST-IPsec

3) Client 설정

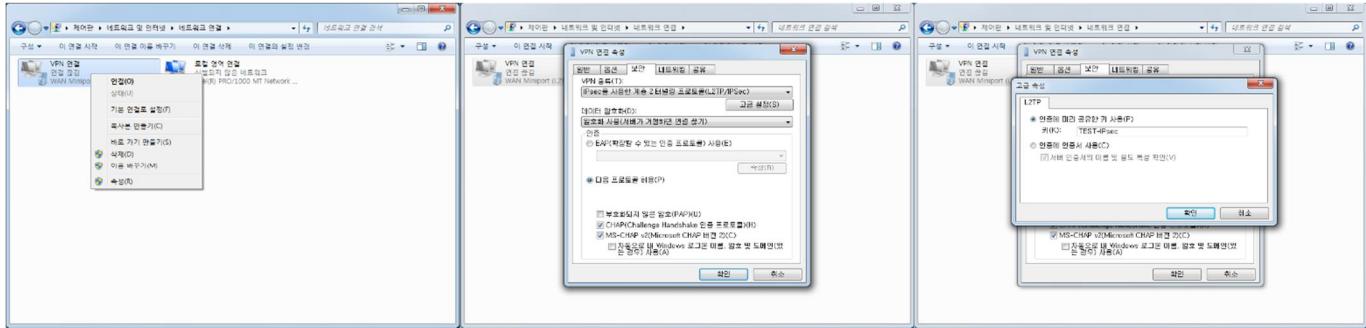


▶ 제어판 > 네트워크 및 공유센터 > 새 연결 설정 > 회사에 연결 > 내 인터넷 연결 사용(VPN)

> 인터넷 연결 설정 > 인터넷 주소 : VPN 서버 IP주소, 대상 이름 : VPN 연결 > 사용자 계정, 암호 입력

※ 네트워크 액세스 권한이 허용된 사용자 계정만 VPN 접속이 가능

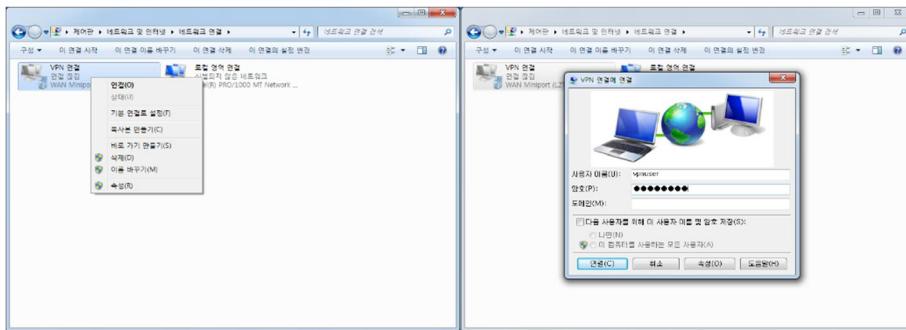
※ dsa.msc > 사용자 계정 우클릭 > 속성 > 전화 접속 로그인 > 네트워크 액세스 권한 : 액세스 허용 체크



▶ 제어판 > 네트워크 및 인터넷 > 네트워크 연결 > VPN 연결 우클릭 > 속성 > 보안 탭

> VPN 종류 : IPsec을 사용한 계층 2 터널링 프로토콜(L2TP/IPSec) 선택 > 고급 설정

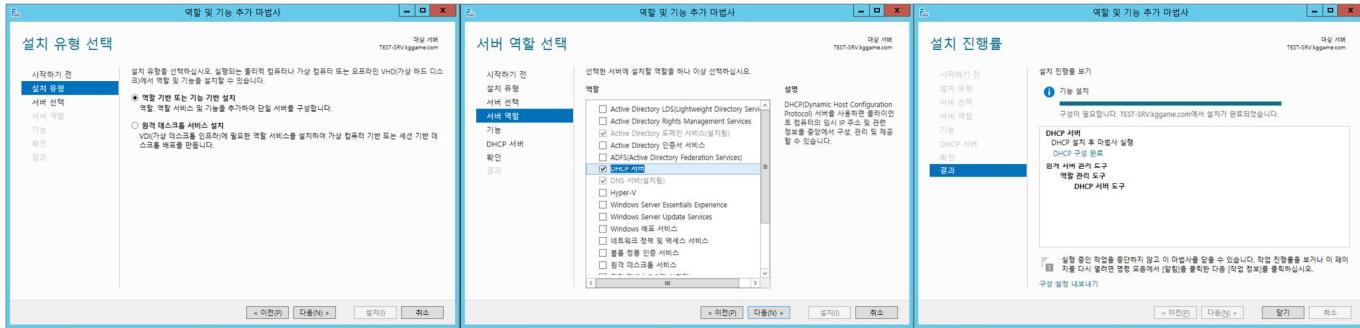
> 인증에 미리 공유한 키 사용 : TEST-IPsec > 확인



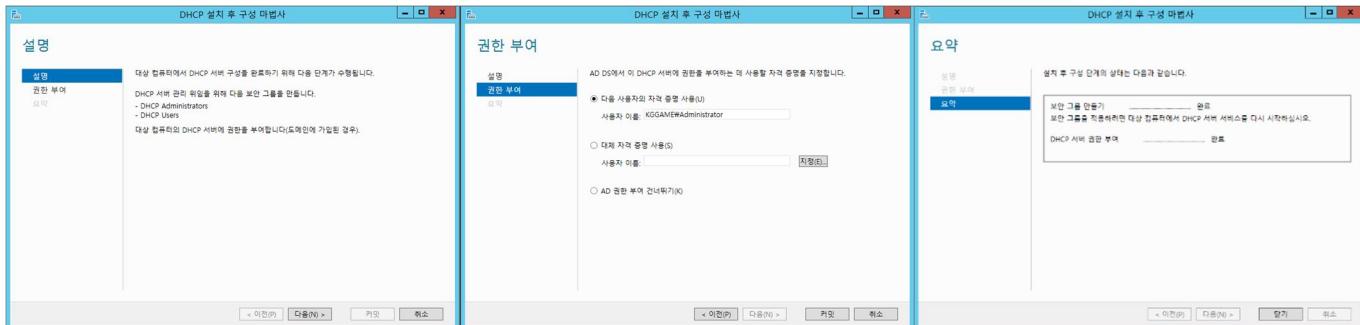
▶ VPN 연결 우클릭 > 연결 > 사용자 계정, 암호 입력

5. DHCP

1) DHCP 서버 설치

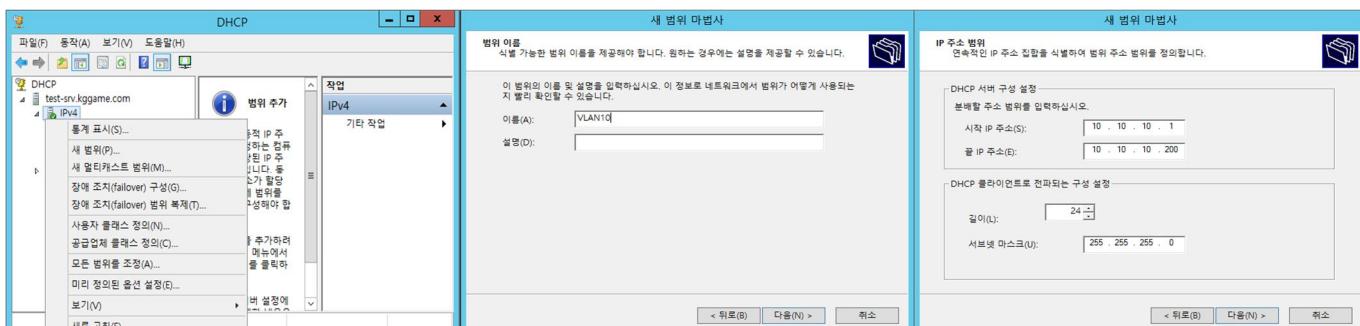


▶ 역할 및 기능 추가 > 서버 역할 : DHCP 서버 선택 > 설치

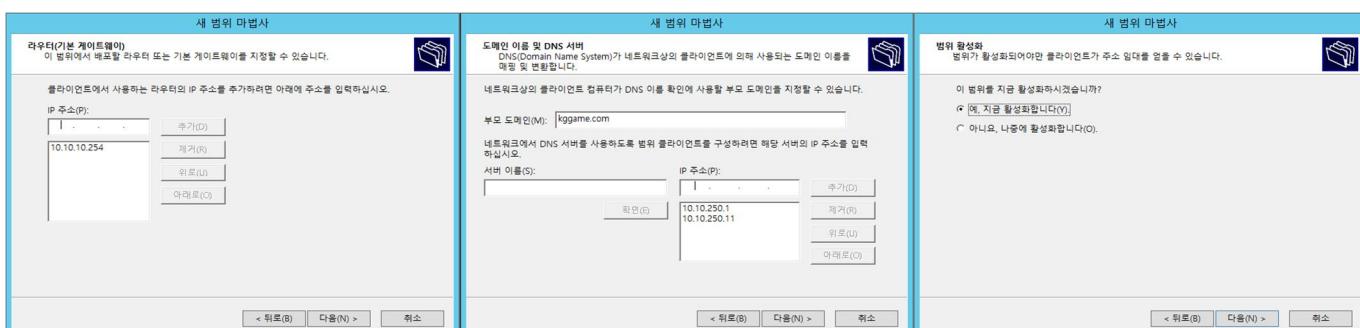


▶ DHCP 구성 완료 선택 > DHCP 서버 보안 그룹 생성 및 권한 부여

2) DHCP 설정



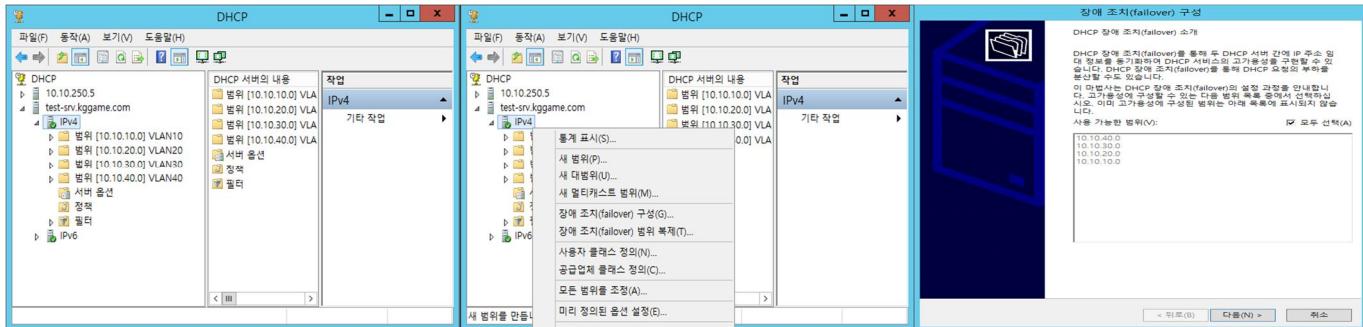
▶ dhcpcmgmt.msc > IPv4 > 새 범위 > 이름 : VLAN10 > 범위 : 10.10.10.1/24 ~ 10.10.10.200/24



▶ VLAN10 라우터 : 10.10.10.254 > DNS : 10.10.250.1, 10.10.250.11 > 범위 활성화

※ 같은 방식으로 VLAN10, 20, 30, 40 총 4개의 범위를 구성

3) DHCP Failover 설정



▶ dhcpcmgmt.msc > IPv4 > 장애 조치(failover) 구성 > 범위 : VLAN10, 20, 30, 40 모두 선택



▶ 서버 추가 > 보조 DHCP 서버 선택 > 모드 : 부하 분산 / 공유 암호 지정

4) DHCP Relayagent 설정

▶ Relayagent는 DSW1, DSW2 스위치에서 ip helper-address로 설정 (VLAN10, 20, 30, 40)

6. Database 서버 (Website DB)

1) DB 서버 설치 및 구성

- DB_01 (Master DB)

```
[root@DB_01 ~]# yum -y install mariadb-*  
[root@DB_01 ~]# systemctl start mariadb  
[root@DB_01 ~]# systemctl enable mariadb
```

```
[root@DB_01 ~]# vi /etc/my.cnf
```

```
[mysqld]  
character-set-server=utf8
```

```
[root@DB_01 ~]# systemctl restart mariadb
```

```
[root@DB_01 ~]# mysql -u root -p -e "show variables like 'c%'";
```

```
Enter password:
```

Variable_name	Value
character_set_client	utf8
character_set_connection	utf8
character_set_database	utf8
character_set_filesystem	binary
character_set_results	utf8
character_set_server	utf8
character_set_system	utf8
character_sets_dir	/usr/share/mysql/charsets/
collation_connection	utf8_general_ci
collation_database	utf8_general_ci
collation_server	utf8_general_ci
completion_type	NO_CHAIN
concurrent_insert	AUTO
connect_timeout	10

```
[root@DB_01 ~]# firewall-cmd --permanent --add-service=mysql  
[root@DB_01 ~]# firewall-cmd --reload
```

```
[root@DB_01 ~]# mysql -u root -p
Enter password:
MariaDB [(none)]> create database webdb;
Query OK, 1 row affected (0.00 sec)
MariaDB [(none)]> grant all privileges on webdb.* to itbank@localhost identified by 'itbank';
Query OK, 0 rows affected (0.01 sec)
MariaDB [(none)]> grant all privileges on webdb.* to itbank@'%' identified by 'itbank';
Query OK, 0 rows affected (0.00 sec)
MariaDB [(none)]> flush privileges;
Query OK, 0 rows affected (0.00 sec)
MariaDB [(none)]> use webdb;
Database changed
MariaDB [webdb]> create table member(No int auto_increment primary key, ID varchar(50) not null, PW varchar(100) not null, Name varchar(50) not null, phone varchar(50) not null, addr varchar(50) not null, Mail varchar(50) not null);
Query OK, 0 rows affected (0.01 sec)
MariaDB [webdb]> create table event_running(No int auto_increment primary key, Title varchar(100) not null, Content varchar(1500), Userid varchar(50) not null, Date varchar(50) not null);
Query OK, 0 rows affected (0.00 sec)
MariaDB [webdb]> create table event_closed(No int auto_increment primary key, Title varchar(100) not null, Content varchar(1500), Userid varchar(50) not null, Date varchar(50) not null);
Query OK, 0 rows affected (0.00 sec)
MariaDB [webdb]> create table event_winner(No int auto_increment primary key, Title varchar(100) not null, Content varchar(1500), Userid varchar(50) not null, Date varchar(50) not null);
Query OK, 0 rows affected (0.00 sec)
MariaDB [webdb]> exit
Bye
```

```
[root@DB_01 ~]# systemctl restart mariadb
```

2) DB Replication

- DB_01 (Master DB 추가 설정)

```
[root@DB_01 ~]# mysql -u root -p mysql
Enter password:
MariaDB [mysql]> grant replication slave on *.* to Rep_user@'%' identified by 'itbank';
Query OK, 0 rows affected (0.00 sec)
MariaDB [mysql]> flush privileges;
```

```
Query OK, 0 rows affected (0.00 sec)
```

```
MariaDB [mysql]> exit
```

```
Bye
```

```
[root@DB_01 ~]# vi /etc/my.cnf
```

```
[mysqld]
```

```
log-bin=mysql-bin
```

```
server-id=1
```

```
[root@DB_01 ~]# systemctl restart mariadb
```

```
[root@DB_01 ~]# mysql -u root -p -e "show master status";
```

```
Enter password:
```

File	Position	Binlog_Do_DB	Binlog_Ignore_DB
mysql-bin.000001	245		

```
[root@DB_01 ~]# mysqldump -u root -p --all-databases > all_backup.sql
```

```
Enter password:
```

```
[root@DB_01 ~]# ls -l
```

```
합계 516
```

-rw-r--r-- 1 root root 518754 9월 27 23:25	all_backup.sql
-rw----- 1 root root 1741 6월 29 15:53	anaconda-ks.cfg
-rw-r--r-- 1 root root 1789 6월 29 15:53	initial-setup-ks.cfg
drwxr-xr-x. 2 root root 6 6월 29 15:54	공개
drwxr-xr-x. 2 root root 6 6월 29 15:54	다운로드
drwxr-xr-x. 2 root root 6 6월 29 15:54	문서
drwxr-xr-x. 2 root root 6 6월 29 15:54	바탕화면
drwxr-xr-x. 2 root root 6 6월 29 15:54	비디오
drwxr-xr-x. 2 root root 6 6월 29 15:54	사진
drwxr-xr-x. 2 root root 6 6월 29 15:54	서식
drwxr-xr-x. 2 root root 6 6월 29 15:54	음악

- DB_02 (Slave DB 설치 및 설정)

```
[root@DB_02 ~]# yum -y install mariadb-*
```

```
[root@DB_02 ~]# systemctl start mariadb
```

```
[root@DB_02 ~]# systemctl enable mariadb
```

```
[root@DB_02 ~]# firewall-cmd --permanent --add-service=mysql
```

```
[root@DB_02 ~]# firewall-cmd --reload
```

```
[root@DB_02 ~]# vi /etc/my.cnf
```

```
[mysqld]
```

```
server-id=2
```

```
replicate-do-db='webdb'
```

```
character-set-server=utf8
```

```
[root@DB_02 ~]# scp 10.10.250.7:/root/all_backup.sql ./
```

```
Are you sure you want to continue connecting (yes/no)? yes
```

```
root@10.10.250.7's password:
```

```
all_backup.sql 100% 507KB 22.3MB/s 00:00
```

```
[root@DB_02 ~]# ls -l
```

```
합계 516
```

```
-rw-r--r--. 1 root root 518754 9월 27 23:30 all_backup.sql
-rw-----. 1 root root 1578 7월 16 19:00 anaconda-ks.cfg
-rw-r--r--. 1 root root 1609 7월 16 19:04 initial-setup-ks.cfg
drwxr-xr-x. 2 root root 6 9월 27 00:58 공개
drwxr-xr-x. 2 root root 6 9월 27 00:58 다운로드
drwxr-xr-x. 2 root root 6 9월 27 00:58 문서
drwxr-xr-x. 2 root root 6 9월 27 00:58 바탕화면
drwxr-xr-x. 2 root root 6 9월 27 00:58 비디오
drwxr-xr-x. 2 root root 6 9월 27 00:58 사진
drwxr-xr-x. 2 root root 6 9월 27 00:58 서식
drwxr-xr-x. 2 root root 6 9월 27 00:58 음악
```

```
[root@DB_02 ~]# mysql -u root -p < all_backup.sql
```

```
Enter password:
```

```
[root@DB_02 ~]# mysql -u root -p
```

```
Enter password:
```

```
MariaDB [(none)]> show databases;
```

```
+-----+  
| Database      |  
+-----+  
| information_schema |  
| mysql          |  
| performance_schema |  
| test           |  
| webdb          |  
+-----+
```

```
5 rows in set (0.00 sec)
```

```
MariaDB [(none)]> change master to master_host='10.10.250.7',
```

```
-> master_user='Rep_user',  
-> master_password='itbank',  
-> master_log_file='mysql-bin.000001',  
-> master_log_pos=245;
```

```
Query OK, 0 rows affected (0.07 sec)
```

```
MariaDB [(none)]> exit
```

```
Bye
```

```
[root@DB_02 ~]# systemctl restart mariadb [mysqld]
```

```
character-set-server=utf8
```

```
[root@DB_01 ~]# systemctl restart mariadb
```

```
[root@DB_01 ~]# mysql -u root -p -e "show variables like 'c%'";
```

```
Enter password:
```

```
+-----+-----+  
| Variable_name | Value  
+-----+-----+
```

3) WEB & DB 서버 연결 설정

- WEB_01 & WEB_02

```
[root@WEB_01 ~]# yum -y install php* --skip
```

```
[root@WEB_01 ~]# systemctl restart httpd
```

```
[root@WEB_01 ~]# vi /var/www/html/php/db_con.php
```

```
<?php  
$db_host = "10.10.250.8";           # Slave DB 주소 (읽기)  
$db_user = "itbank";  
$db_pass = "itbank";  
$db_name = "webdb";  
$conn = mysqli_connect($db_host,$db_user,$db_pass,$db_name);  
?>
```

```
[root@WEB_01 ~]# vi /var/www/html/php/db_con_master.php
```

```
<?php  
$db_host = "10.10.250.7";           # Master DB 주소 (쓰기)  
$db_user = "itbank";  
$db_pass = "itbank";  
$db_name = "webdb";  
$conn = mysqli_connect($db_host,$db_user,$db_pass,$db_name);  
?>
```

```
[root@WEB_01 ~]# vi /var/www/html/php/signup.php
```

```
2 require_once("./db_con_master.php");
```

```
[root@WEB_01 ~]# vi /var/www/html/php/delete_running.php
```

```
2 require_once("./db_con_master.php");
```

```
[root@WEB_01 ~]# vi /var/www/html/php/delete_closed.php
```

```
2 require_once("./db_con_master.php");
```

```
[root@WEB_01 ~]# vi /var/www/html/php/delete_winner.php
```

```
2 require_once("./db_con_master.php");
```

```
[root@WEB_01 ~]# vi /var/www/html/php/write_running.php
```

```
2 require_once("./db_con_master.php");
```

```
[root@WEB_01 ~]# vi /var/www/html/php/write_closed.php
```

```
2 require_once("./db_con_master.php");
```

```
[root@WEB_01 ~]# vi /var/www/html/php/write_winner.php
```

```
2 require_once("./db_con_master.php");
```

```
[root@WEB_01 ~]# systemctl restart httpd
```

V 외부 IT 인프라

1. DNS 서버

1) DNS 서버 구축 및 이중화 설정

- VM01 Master장비 설정

```
[root@VM01 ~]# yum -y install bind-*
```

```
[root@VM01 ~]# vi /etc/named.conf
```

```
13      listen-on port 53 { any; };
21      allow-query     { any; };
33      recursion no;
```

```
[root@VM01 ~]# vi /etc/named.rfc1912.zones
```

```
zone "kggame.com" IN {
    type master;
    file "kggame.zone";
    also-notify { 192.10.10.102; };
    allow-transfer { 192.10.10.102; };
};

zone "1.168.192.in-addr.arpa" IN {
    type master;
    file "kggame.rev";
    also-notify { 192.10.10.102; };
    allow-transfer { 192.10.10.102; };
};
```

```
[root@VM01 ~]# cd /var/named
```

```
[root@VM01 named]# ls
```

```
chroot  chroot_sdb  data  dynamic  dyndb-ldap  named.ca  named.empty  named.localhost
named.loopback  slaves
```

```
[root@VM01 named]# cp ./named.empty ./kggame.zone
```

```
[root@VM01 named]# vi ./kggame.zone
```

```
$TTL 3H
```

```
@      IN SOA  ns1.kggame.com.      root (
                                0      ; serial
                                1D     ; refresh
                                1H     ; retry
```

```

1W      ; expire
3H )    ; minimum

IN      NS      ns1.kggame.com.
IN      NS      ns2.kggame.com.

ns1    IN      A      192.10.10.101
ns2    IN      A      192.10.10.102
@      IN      A      192.10.10.101
www    IN      A      192.10.10.101

```

[root@VM01 named]# cp ./named.empty ./kggame.rev

[root@VM01 named]# vi ./kggame.rev

\$TTL 3H

```

@      IN SOA   ns1.kggame.com.      root (
                                         0      ; serial
                                         1D     ; refresh
                                         1H     ; retry
                                         1W     ; expire
                                         3H )   ; minimum

IN      NS      ns1.kggame.com.
IN      NS      ns2.kggame.com.

128    IN      PTR     ns1.kggame.com.
129    IN      PTR     ns2.kggame.com.
128    IN      PTR     kggame.com.
128    IN      PTR     www.kggame.com.

```

[root@VM01 named]# chown .named ./kggame.*

[root@VM01 named]# ls -ld ./kggame.*

-rw-r----- 1 root named 228 9월 4 15:31 ./kggame.rev

-rw-r----- 1 root named 233 9월 4 15:29 ./kggame.zone

[root@VM01 named]# systemctl start named

[root@VM01 named]# systemctl enable named

Created symlink from /etc/systemd/system/multi-user.target.wants/named.service to /usr/lib/systemd/system/named.service.

[root@VM01 named]# firewall-cmd --permanent --add-service=dns

success

[root@VM01 named]# firewall-cmd --reload

success

```
[root@VM01 named]# firewall-cmd --list-all  
services: dhcipv6-client dns ssh
```

- **VM02 Slave장비 설정**

```
[root@VM02 ~]# yum -y install bind-*
```

```
[root@VM02 ~]# firewall-cmd --permanent --add-service=dns  
success
```

```
[root@VM02 ~]# firewall-cmd --reload  
success
```

```
[root@VM02 ~]# systemctl start named
```

```
[root@VM02 ~]# systemctl enable named
```

```
[root@VM02 ~]# vi /etc/named.conf
```

```
13      listen-on port 53 { any; };  
21      allow-query   { any; };  
33      recursion no;
```

```
[root@VM02 ~]# vi /etc/named.rfc1912.zones
```

```
zone "kggame.com" IN {  
    type slave;  
    file "slaves/kggame.zone.slave";  
    notify yes;  
    masterfile-format text;  
    masters { 192.10.10.101; };  
};
```

```
zone "1.168.192.in-addr.arpa" IN {  
    type slave;  
    file "slaves/kggame.rev.slave";  
    notify yes;  
    masterfile-format text;  
    masters { 192.10.10.101; };  
};
```

```
[root@VM02 ~]# systemctl restart named
```

```
[root@VM02 ~]# cd /var/named/slaves
```

```
[root@VM02 slaves]# ls -l
```

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```
-rw-r--r-- 1 named named 393 9월 4 15:54 kggame.rev.slave
```

```
-rw-r--r-- 1 named named 353 9월 4 15:54 kggame.zone.slave
```

2. 웹 서버

1) 웹 서버 구축 및 이중화 설정

- WEB01 & WEB_02

```
[root@WEB_01 ~]# yum -y install httpd-*  
[root@WEB_01 ~]# rpm -qa | grep httpd  
httpd-tools-2.4.6-97.el7.centos.x86_64  
httpd-2.4.6-97.el7.centos.x86_64  
httpd-devel-2.4.6-97.el7.centos.x86_64  
httpd-manual-2.4.6-97.el7.centos.noarch  
[root@WEB_01 ~]# firewall-cmd --permanent --add-service=http  
success  
[root@WEB_01 ~]# firewall-cmd --reload  
success  
[root@WEB_01 ~]# apachectl configtest  
Syntax OK
```

```
[root@WEB_01 ~]# vi /etc/httpd/conf/httpd.conf  
66 User nobody  
67 Group nobody  
86 ServerAdmin root@kggame.com  
95 ServerName www.kggame.com:80
```

```
[root@WEB_01 ~]# apachectl configtest
```

```
Syntax OK
```

```
[root@WEB_01 ~]# systemctl start httpd
```

```
[root@WEB_01 ~]# systemctl enable httpd
```

```
[root@WEB_01 named]# netstat -antp | grep httpd
```

```
tcp6      0      0 :::80                  :::*                  LISTEN      2517/httpd
```

3. Proxy 서버

1) Haproxy 소스 설치

- HA_01 & HA_02

```
[root@ha-01 ~]# yum -y install gcc openssl openssl-devel systemd-devel  
[root@ha-01 ~]# mkdir /Haproxy  
[root@ha-01 ~]# cd /Haproxy/  
[root@ha-01 Haproxy]# wget https://www.haproxy.org/download/2.3/src/haproxy-2.3.10.tar.gz  
[root@ha-01 Haproxy]# tar xvfz haproxy-2.3.10.tar.gz  
[root@ha-01 Haproxy]# cd haproxy-2.3.10/  
[root@ha-01 haproxy-2.3.10]# make TARGET=linux-glibc USE_OPENSSL=1 USE_SYSTEMD=1  
[root@ha-01 haproxy-2.3.10]# make install  
  
[root@ha-01      haproxy-2.3.10]# curl      "https://git.haproxy.org/?p=haproxy-  
2.3.git;a=blob_plain;f=contrib/systemd/haproxy.service.in;" -o /etc/systemd/system/haproxy.service  
[root@ha-01 haproxy-2.3.10]# ls -l /etc/systemd/system/haproxy.service  
-rw-r--r-- 1 root root 1405 9월  7 19:28 /etc/systemd/system/haproxy.service  
[root@ha-01 haproxy-2.3.10]# which haproxy  
/usr/local/sbin/haproxy  
[root@ha-01 haproxy-2.3.10]# vi /etc/systemd/system/haproxy.service  
ExecStartPre=/usr/local/sbin/haproxy -f $CONFIG -c -q $EXTRAOPTS  
ExecStart=/usr/local/sbin/haproxy -Ws -f $CONFIG -p $PIDFILE $EXTRAOPTS  
ExecReload=/usr/local/sbin/haproxy -Ws -f $CONFIG -c -q $EXTRAOPTS  
  
[root@ha-01 haproxy-2.3.10]# mkdir /etc/haproxy  
[root@ha-01 haproxy-2.3.10]# mkdir /etc/haproxy/certs  
[root@ha-01 haproxy-2.3.10]# mkdir /etc/haproxy/errors  
[root@ha-01 haproxy-2.3.10]# mkdir /var/log/haproxy  
  
[root@ha-01 haproxy-2.3.10]# cd ./examples/errorfiles/  
[root@ha-01 errorfiles]# cp ./*http /etc/haproxy/errors/  
[root@ha-01 errorfiles]# ls -l /etc/haproxy/errors/  
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-rw-r--r-- 1 root root 188 9월  7 19:34 400.http  
-rw-r--r-- 1 root root 189 9월  7 19:34 403.http  
-rw-r--r-- 1 root root 213 9월  7 19:34 408.http  
-rw-r--r-- 1 root root 205 9월  7 19:34 500.http
```

```
-rw-r--r-- 1 root root 205 9월 7 19:34 502.http  
-rw-r--r-- 1 root root 213 9월 7 19:34 503.http  
-rw-r--r-- 1 root root 195 9월 7 19:34 504.http
```

```
[root@ha-01 errorfiles]# useradd -c "HAProxy Daemon User" -s /sbin/nologin haproxy
```

```
[root@ha-01 errorfiles]# tail -1 /etc/passwd
```

```
haproxy:x:1001:1001:HAProxy Daemon User:/home/haproxy:/sbin/nologin
```

```
[root@ha-01 errorfiles]# vi /etc/rsyslog.d/haproxy.conf
```

```
$ModLoad imudp  
$UDPServerAddress 127.0.0.1  
$UDPServerRun 514  
local0.* /var/log/haproxy/haproxy-traffic.log
```

```
[root@ha-01 ~]# vi /etc/logrotate.d/haproxy
```

```
/var/log/haproxy/*.log {  
    daily  
    rotate 30  
    create 0600 root root  
    compress  
    notifempty  
    missingok  
    sharedscripts  
    postrotate  
        /bin/systemctl restart rsyslog.service > /dev/null 2>/dev/null || true  
    endscript  
}  
[root@ha-01 errorfiles]# firewall-cmd --permanent --add-port=514/udp  
success  
[root@ha-01 errorfiles]# firewall-cmd --reload  
Success
```

2) Proxy 서버 구축 (웹 서버 이중화 및 로드밸런싱)

- HA_01 & HA_02

```
[root@ha-01 ~]# vi /etc/haproxy/haproxy.cfg
```

```
global
```

```
    daemon  
    maxconn 20000  
    user haproxy  
    group haproxy  
    log 127.0.0.1:514 local0
```

```
defaults
```

```
    mode http  
    option redispatch  
    retries 3  
    log global
```

```
    option httplog  
    option dontlognull  
    option dontlog-normal  
    option http-server-close  
    option forwardfor
```

```
    maxconn 15000  
    timeout connect 10s  
    timeout http-request 10s  
    timeout http-keep-alive 10s  
    timeout client 1m  
    timeout server 1m  
    timeout queue 1m
```

```
    errorfile 400 /etc/haproxy/errors/400.http  
    errorfile 403 /etc/haproxy/errors/403.http  
    errorfile 408 /etc/haproxy/errors/408.http  
    errorfile 500 /etc/haproxy/errors/500.http  
    errorfile 502 /etc/haproxy/errors/502.http  
    errorfile 503 /etc/haproxy/errors/503.http
```

```
errorfile 504 /etc/haproxy/errors/504.http
```

listen stats

```
bind *:9000
stats enable
stats realm Haproxy Stats Page
stats uri /
stats auth admin:haproxy1
```

frontend proxy

```
bind *:80
default_backend WEB_SRV_list
```

backend WEB_SRV_list

```
balance roundrobin
option httpchk HEAD /
http-request set-header X-Forwarded-Port %[dst_port]
cookie SRVID insert indirect nocache maxlife 10m
server WEB_01 192.10.10.103:80 cookie WEB_01 check inter 3000 fall 5 rise 3
server WEB_02 192.10.10.104:80 cookie WEB_02 check inter 3000 fall 5 rise 3
```

```
[root@ha-01 ~]# haproxy -f /etc/haproxy/haproxy.cfg -c
```

```
Configuration file is valid
```

```
[root@ha-01 ~]# systemctl start haproxy
```

```
[root@ha-01 ~]# systemctl enable haproxy
```

```
[root@ha-01 ~]# firewall-cmd --permanent --add-service=http
```

```
success
```

```
[root@ha-01 ~]# firewall-cmd --permanent --add-port=9000/tcp
```

```
success
```

```
[root@ha-01 ~]# firewall-cmd --reload
```

```
success
```

```
[root@ha-01 errorfiles]# netstat -antp
```

```
Active Internet connections (servers and established)
```

Proto	Recv-Q	Send-Q	Local Address	Foreign Address	State	PID/Program name
tcp	0	0	0.0.0.0:9000	0.0.0.0:*	LISTEN	3763/haproxy
tcp	0	1	192.10.10.105:55004	192.10.10.104:80	SYN_SENT	3763/haproxy

WEB_01의 Log Format 변경

```
[root@WEB_01 httpd]# vi /etc/httpd/conf/httpd.conf
SetEnvIf Request_Method HEAD Health-Check
CustomLog "logs/access_log" combined env!=Health-Check
LogFormat "%{x-forwarded-for}i %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
[root@WEB_01 httpd]# systemctl restart httpd
```

WEB_02의 Log Format 변경

```
[root@WEB_02 httpd]# vi /etc/httpd/conf/httpd.conf
SetEnvIf Request_Method HEAD Health-Check
CustomLog "logs/access_log" combined env!=Health-Check
LogFormat "%{x-forwarded-for}i %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
[root@WEB_02 httpd]# systemctl restart httpd
```

3) SSL/TLS 적용

- HA_01 & HA_02 (인증키: ha01, ha02)

```
[root@ha-01 errorfiles]# rpm -qa | grep openssl
openssl-devel-1.0.2k-21.el7_9.x86_64
openssl-1.0.2k-21.el7_9.x86_64
openssl-libs-1.0.2k-21.el7_9.x86_64
[root@ha-01 errorfiles]# openssl genrsa -out /etc/haproxy/certs/ha01.key 2048
Generating RSA private key, 2048 bit long modulus
..+++
.....+++
e is 65537 (0x10001)
```

```
[root@ha-01 errorfiles]# openssl req -new -key /etc/haproxy/certs/ha01.key -out /etc/haproxy/certs/ha01.csr
You are about to be asked to enter information that will be incorporated
into your certificate request.
```

What you are about to enter is what is called a Distinguished Name or a DN.

There are quite a few fields but you can leave some blank

For some fields there will be a default value,

If you enter '.', the field will be left blank.

Country Name (2 letter code) [XX]:KR

State or Province Name (full name) []:Seoul
Locality Name (eg, city) [Default City]:Gangnam
Organization Name (eg, company) [Default Company Ltd]:KGGAME
Organizational Unit Name (eg, section) []:Cloud Team
Common Name (eg, your name or your server's hostname) []:www.kggame.com
Email Address []:root@kggame.com

Please enter the following 'extra' attributes

to be sent with your certificate request

A challenge password []:

An optional company name []:

```
[root@ha-01 errorfiles]# openssl x509 -req -days 365 -in /etc/haproxy/certs/ha01.csr -signkey /etc/haproxy/certs/ha01.key -out /etc/haproxy/certs/ha01.crt
```

Signature ok

```
subject=/C=KR/ST=Seoul/L=Gangnam/O=KGGAME/OU=Cloud Team/CN=www.kggame.com/emailAddress=root@kggame.com
```

Getting Private key

```
[root@ha-01 ~]# cd /etc/haproxy/certs  
[root@ha-01 certs]# cat ha01.crt ha01.key > ha01_ssl.crt  
[root@ha-01 certs]# mv ha01.* /backup  
[root@ha-01 certs]# ls /backup  
ha01.crt ha01.csr ha01.key
```

```
[root@ha-01 certs]# vi /etc/haproxy/haproxy.cfg
```

[Global 영역에 추가]

```
ssl-default-bind-ciphers ECDHE-ECDSA-AES256-GCM-SHA384:ECDHE-RSA-AES256-GCM-SHA384:ECDHE-  
ECDSA-CHACHA20-POLY1305:ECDHE-RSA-CHACHA20-POLY1305:ECDHE-ECDSA-AES128-GCM-  
SHA256:ECDHE-RSA-AES128-GCM-SHA256:ECDHE-ECDSA-AES256-SHA384:ECDHE-RSA-AES256-  
SHA384:ECDHE-ECDSA-AES128-SHA256:ECDHE-RSA-AES128-SHA256  
ssl-default-bind-options ssl-min-ver TLSv1.2 no-tls-tickets
```

[Frontend 영역에 추가]

```
bind *:443 ssl crt /etc/haproxy/certs/ha01_ssl.crt  
http-request redirect scheme https code 308 unless { ssl_fc }
```

```
[root@ha-01 certs]# haproxy -f /etc/haproxy/haproxy.cfg -c
Configuration file is valid
[root@ha-01 certs]# firewall-cmd --permanent --add-service=https
success
[root@ha-01 certs]# firewall-cmd --reload
success
[root@ha-01 certs]# systemctl restart haproxy
```

4) Haproxy 서버 고가용성 구축

- HA_01 (Master; Priority 110) & HA_02 (Backup; Priority 100)

```
[root@ha-01 ~]# echo net.ipv4.ip_nonlocal_bind=1 >> /etc/sysctl.conf
[root@ha-01 ~]# sysctl -p
net.ipv4.ip_nonlocal_bind = 1
[root@ha-01 ~]# yum -y install keepalived-*
```

```
[root@ha-01 ~]# vi /etc/keepalived/keepalived.conf
global_defs {
    router_id HA_01
}
```

```
vrrp_script HA_Check {
    script "killall -0 haproxy"
    interval 1
    rise 3
    fall 3
    weight 2
}
```

```
vrrp_instance HAGroup_1 {
    state MASTER
    interface ens32
    garp_master_delay 5
    virtual_router_id 51
    priority 110
    advert_int 1
    authentication {
```

```
auth_type PASS
auth_pass test123
}
virtual_ipaddress {
    192.10.10.107
}
track_script {
    HA_Check
}
}
```

```
[root@ha-01 ~]# firewall-cmd --direct --add-rule ipv4 filter INPUT 1 -i ens32 -d 224.0.0.18 -p vrrp -j ACCEPT
success
[root@ha-01 ~]# firewall-cmd --direct --add-rule ipv4 filter OUTPUT 1 -o ens32 -d 224.0.0.18 -p vrrp -j ACCEPT
success
[root@ha-01 ~]# firewall-cmd --runtime-to-permanent
success
[root@ha-01 ~]# firewall-cmd --direct --get-all-rules
ipv4 filter OUTPUT 1 -o ens32 -d 224.0.0.18 -p vrrp -j ACCEPT
ipv4 filter INPUT 1 -i ens32 -d 224.0.0.18 -p vrrp -j ACCEPT
[root@ha-01 ~]# systemctl start keepalived
[root@ha-01 ~]# systemctl enable keepalived
Created symlink from /etc/systemd/system/multi-user.target.wants/keepalived.service to
/usr/lib/systemd/system/keepalived.service.
```

4. Channel-Bonding

1) 서버에 channel-bonding 구축하기

- WEB Server 1,2

서버에 네트워크 어댑터(NAT) 1개 추가

```
[root@web-01 ~]# ip link set dev ens34 up
```

```
[root@web-01 ~]# dhclient -v ens34
```

Internet Systems Consortium DHCP Client 4.2.5

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For info, please visit <https://www.isc.org/software/dhcp/>

Listening on LPF/ens34/00:0c:29:b2:97:f9

Sending on LPF/ens34/00:0c:29:b2:97:f9

Sending on Socket/fallback

DHCPDISCOVER on ens34 to 255.255.255.255 port 67 interval 4 (xid=0xcef119b)

DHCPPREQUEST on ens34 to 255.255.255.255 port 67 (xid=0xcef119b)

DHCPOFFER from 192.10.10.234

DHCPPACK from 192.10.10.234 (xid=0xcef119b)

bound to 192.10.10.134 -- renewal in 793 seconds.

```
[root@web-01 ~]# ifconfig
```

ens32: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500

 inet 192.10.10.131 netmask 255.255.255.0 broadcast 192.10.10.255

 inet6 fe80::a3eb:b065:a922:aef8 prefixlen 64 scopeid 0x20<link>

 ether 00:0c:29:4f:8e:ba txqueuelen 1000 (Ethernet)

 RX packets 708 bytes 818446 (799.2 KiB)

 RX errors 0 dropped 0 overruns 0 frame 0

 TX packets 254 bytes 24333 (23.7 KiB)

 TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

ens34: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500

 inet 192.10.10.134 netmask 255.255.255.0 broadcast 192.10.10.255

 inet6 fe80::b918:df84:2dac:f038 prefixlen 64 scopeid 0x20<link>

 ether 00:0c:29:4f:8e:c4 txqueuelen 1000 (Ethernet)

 RX packets 76 bytes 13413 (13.0 KiB)

 RX errors 0 dropped 0 overruns 0 frame 0

```
TX packets 32 bytes 4911 (4.7 KiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
[root@web-01 ~]# yum -y install bind-utils ethtool
[root@web-01 ~]# cd /etc/sysconfig/network-scripts
[root@web-01 network-scripts]# vi ./ifcfg-bond0
```

```
DEVICE=bond0
ONBOOT=yes
USERCTL=no
NM_CONTROLLED=no
BOOTPROTO=none
BONDING_OPTS="mode=0 miimon=100"
IPADDR=192.10.10.103
```

```
# Web _Server2 ip : 192.10.10.104
NETMASK=255.255.255.0
GATEWAY=192.10.10.234
```

```
DNS1=8.8.8.8
DNS2=192.10.10.101
```

```
[root@MyLinux network-scripts]# vi ./ifcfg-ens32
```

```
DEVICE=ens32
ONBOOT=yes
USERCTL=no
NM_CONTROLLED=no
BOOTPROTO=none
MASTER=bond0
SLAVE=yes
NAME=ens32
```

```
[root@web-01 network-scripts]# cp ./ifcfg-ens32 ./ifcfg-ens34
[root@web-01 network-scripts]# vi ./ifcfg-ens34
```

```
DEVICE=ens34
ONBOOT=yes
USERCTL=no
```

```
NM_CONTROLLED=no  
BOOTPROTO=none  
MASTER=bond0  
SLAVE=yes  
NAME=ens34
```

```
[root@web-01 ~]# systemctl stop NetworkManager
```

```
[root@web-01 ~]# init 6
```

2) bonding이 제대로 되었는지 확인하기

- WEB Server 1,2

ip주소 192.10.10.103으로 접속

```
# Web _Server2 ip : 192.10.10.104
```

```
[root@web-01 ~]# ifconfig
```

```
bond0: flags=5187<UP,BROADCAST,RUNNING,MASTER,MULTICAST> mtu 1500  
        inet 192.10.10.103 netmask 255.255.255.0 broadcast 192.10.10.234  
              inet6 fe80::20c:29ff:fe4f:8eba prefixlen 64 scopeid 0x20<link>  
                    ether 00:0c:29:4f:8e:ba txqueuelen 1000 (Ethernet)  
                      RX packets 90 bytes 9564 (9.3 KiB)  
                      RX errors 0 dropped 0 overruns 0 frame 0  
                      TX packets 99 bytes 12673 (12.3 KiB)  
                      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
ens32: flags=6211<UP,BROADCAST,RUNNING,SLAVE,MULTICAST> mtu 1500  
        ether 00:0c:29:4f:8e:ba txqueuelen 1000 (Ethernet)  
          RX packets 82 bytes 9084 (8.8 KiB)  
          RX errors 0 dropped 0 overruns 0 frame 0  
          TX packets 99 bytes 12673 (12.3 KiB)  
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
ens34: flags=6211<UP,BROADCAST,RUNNING,SLAVE,MULTICAST> mtu 1500  
        ether 00:0c:29:4f:8e:ba txqueuelen 1000 (Ethernet)  
          RX packets 8 bytes 480 (480.0 B)  
          RX errors 0 dropped 0 overruns 0 frame 0  
          TX packets 0 bytes 0 (0.0 B)  
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
[root@web-01 ~]# cat /proc/net/bonding/bond0
```

Bonding Mode: load balancing (round-robin)

MII Status: up

MII Polling Interval (ms): 100

Up Delay (ms): 0

Down Delay (ms): 0

Slave Interface: ens32

MII Status: up

Speed: 1000 Mbps

Duplex: full

Link Failure Count: 1

Permanent HW addr: 00:0c:29:4f:8e:ba

Slave queue ID: 0

Slave Interface: ens34

MII Status: up

Speed: 1000 Mbps

Duplex: full

Link Failure Count: 0

Permanent HW addr: 00:0c:29:4f:8e:c4

Slave queue ID: 0

ens32 disconnect 후에도 ping이 끊기지 않음을 확인

```
[root@web-01 ~]# ping 8.8.8.8
```

PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.

64 bytes from 8.8.8.8: icmp_seq=56 ttl=128 time=40.5 ms

64 bytes from 8.8.8.8: icmp_seq=57 ttl=128 time=40.7 ms

--- 8.8.8.8 ping statistics ---

58 packets transmitted, 58 received, 0% packet loss, time 57205ms

rtt min/avg/max/mdev = 39.308/54.124/235.779/44.250 ms

```
[root@web-01 ~]# watch -d -n 1 "cat /proc/net/bonding/bond0"
```

Bonding Mode: load balancing (round-robin)

MII Status: up

MII Polling Interval (ms): 100

Up Delay (ms): 0

Down Delay (ms): 0

Slave Interface: ens32

MII Status: down

Speed: Unknown

Duplex: Unknown

Link Failure Count: 5

Permanent HW addr: 00:0c:29:d2:7e:9b

Slave queue ID: 0

Slave Interface: ens34

MII Status: up

Speed: 1000 Mbps

Duplex: full

Link Failure Count: 3

Permanent HW addr: 00:0c:29:d2:7e:a5

5. Raid

1) 서버에 Raid6 구축하기

- Game Server 1,2 & WEB Server 1,2

서버에 HDD 4개+2개(복구용) 추가하기

```
[root@VM01 ~]#fdisk /dev/sdb ->n ->p ->1 ->enter ->enter ->t ->fd ->p ->w  
[root@VM01 ~]#fdisk /dev/sdc ->n ->p ->1 ->enter ->enter ->t ->fd ->p ->w  
[root@VM01 ~]#fdisk /dev/sdd ->n ->p ->1 ->enter ->enter ->t ->fd ->p ->w  
[root@VM01 ~]#fdisk /dev/sde ->n ->p ->1 ->enter ->enter ->t ->fd ->p ->w  
[root@VM01 ~]#fdisk /dev/sdf ->n ->p ->1 ->enter ->enter ->t ->fd ->p ->w  
[root@VM01 ~]#fdisk /dev/sdg ->n ->p ->1 ->enter ->enter ->t ->fd ->p ->w  
[root@VM01 ~]# mknod /dev/md1 b 9 6
```

```
[root@VM01 ~]# mdadm --create /dev/md6 --level=6 --raid-devices=4 /dev/sdb1 /dev/sdc1 /dev/sdd1 /dev/sde1
```

mdadm: Defaulting to version 1.2 metadata

mdadm: array /dev/md6 started.

```
[root@VM01 ~]# mdadm --detail --scan
```

```
ARRAY /dev/md6 metadata=1.2 name=VM01:6 UUID=d7bbb807:cd949f91:c6f7772b:8f44f6ce
```

```
[root@VM01 ~]# mdadm --query --detail /dev/md6
```

/dev/md6:

Number	Major	Minor	RaidDevice	State
0	8	17	0	active sync /dev/sdb1
1	8	33	1	active sync /dev/sdc1
2	8	49	2	active sync /dev/sdd1
3	8	65	3	active sync /dev/sde1

```
[root@VM01 ~]# mkfs.xfs /dev/md6
```

```
meta-data=/dev/md6          isize=512    agcount=16, agsize=654720 blks  
                          =           sectsz=512   attr=2, projid32bit=1  
                          =           crc=1       finobt=0, sparse=0  
data     =           bsize=4096   blocks=10475520, imaxpct=25  
          =           sunit=128    swidth=256 blks  
naming  =version 2        bsize=4096   ascii-ci=0 fttype=1  
log      =internal log    bsize=4096   blocks=5120, version=2  
          =           sectsz=512   sunit=8 blks, lazy-count=1  
realtime =none            extsz=4096   blocks=0, rtextents=0
```

```
[root@VM01 ~]# mkdir /raid6
```

```
[root@VM01 ~]# mount /dev/md6 /raid6
```

```
[root@VM01 ~]# df -h
/dev/md6              40G   33M   40G   1% /raid6
[root@VM01 ~]# mdadm --detail --scan > /etc/mdadm.conf
[root@VM01 ~]# vi /etc/fstab
[root@VM01 ~]# reboot
[root@VM01 ~]# df -h
/dev/md6              40G   33M   40G   1% /raid6
```

2) Raid6 복구방법

- Game Server 1,2 & WEB Server 1,2

vmware 종료한 상태에서, raid6의 디스크 중 2개 제거하기

/dev/md6:

Number	Major	Minor	RaidDevice	State
-	0	0	0	removed
1	8	17	1	active sync /dev/sdb1
-	0	0	2	removed
3	8	33	3	active sync /dev/sdc1

```
[root@VM01 ~]# mdadm /dev/md6 --add /dev/sdd1
```

mdadm: added /dev/sdd1

```
[root@VM01 ~]# mdadm /dev/md6 --add /dev/sde1
```

mdadm: added /dev/sde1

```
[root@VM01 ~]# mdadm --query --detail /dev/md6
```

/dev/md6:

Number	Major	Minor	RaidDevice	State
4	8	49	0	spare rebuilding /dev/sdd1
1	8	17	1	active sync /dev/sdb1
5	8	65	2	spare rebuilding /dev/sde1
3	8	33	3	active sync /dev/sdc1

```
[root@VM01 ~]# mdadm --detail --scan > /etc/mdadm.conf
```

3) 서버에 Raid1 구축하기

- DNS Server 1,2

서버에 HDD 2개+1개(복구용) 추가하기

```
[root@VM01 ~]#fdisk /dev/sdb ->n ->p ->1 ->enter ->enter ->t ->fd ->p ->w
```

```
[root@VM01 ~]#fdisk /dev/sdc ->n ->p ->1 ->enter ->enter ->t ->fd ->p ->w
```

```
[root@VM01 ~]#fdisk /dev/sdd ->n ->p ->1 ->enter ->enter ->t ->fd ->p ->w
```

```
[root@VM01 ~]# mknod /dev/md1 b 9 1
```

```
[root@VM01 ~]# mdadm --create /dev/md1 --level=1 --raid-devices=2 /dev/sdb1 /dev/sdc1
mdadm: Note: this array has metadata at the start and
      may not be suitable as a boot device. If you plan to
      store '/boot' on this device please ensure that
      your boot-loader understands md/v1.x metadata, or use
      --metadata=0.90

Continue creating array? Y
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md1 started.

[root@VM01 ~]# mkfs.xfs /dev/md1
meta-data=/dev/md1              isize=512    agcount=4, agsize=1309568 blks
                                  =                      sectsz=512  attr=2, projid32bit=1
                                  =                      crc=1      finobt=0, sparse=0
data     =                      bsize=4096   blocks=5238272, imaxpct=25
          =                      sunit=0      swidth=0 blks
naming   =version 2             bsize=4096   ascii-ci=0 fttype=1
log       =internal log         bsize=4096   blocks=2560, version=2
          =                      sectsz=512  sunit=0 blks, lazy-count=1
realtime =none                  extsz=4096   blocks=0, rtextents=0

[root@VM01 ~]# mkdir /raid1
[root@VM01 ~]# mount /dev/md1 /raid1
[root@VM01 ~]# df -h
/dev/md1              20G  33M  20G  1% /raid1
[root@VM01 ~]# mdadm --detail --scan > /etc/mdadm.conf
[root@VM01 ~]# vi /etc/fstab
/dev/md1      /raid1        xfs      defaults      0 0

[root@VM01 ~]# reboot
[root@VM01 ~]# df -h
/dev/md1              20G  33M  20G  1% /raid1
```

4) Raid1 복구방법

- DNS Server 1,2

vmware 종료한 상태에서, raid1의 디스크 중 1개 제거하기

```
[root@VM01 ~]# mdadm --query --detail /dev/md1
```

```
/dev/md1:
```

Number	Major	Minor	RaidDevice	State
0	8	17	0	active sync /dev/sdb1

```
-      0      0      1      removed

[root@VM01 ~]# umount /dev/md1
[root@VM01 ~]# mdadm /dev/md1 -r /dev/sdc1
[root@VM01 ~]# mdadm /dev/md1 --add /dev/sdc1
mdadm: added /dev/sdc1
[root@VM01 ~]# mdadm --query --detail /dev/md1
/dev/md1:
      Number  Major  Minor  RaidDevice State
          0      8      17        0  active sync  /dev/sdb1
          2      8      33        1  active sync  /dev/sdc1

[root@VM01 ~]# mdadm --detail --scan > /etc/mdadm.conf
```



THANK YOU