12. k8s의 인증 & 인가

I k8s의 인증

- k8s의 자체적인 인증 기능 없음
  - k8s 클러스터를 운영하는 환경의 인증 기능을 적용하라는 것
- 예시
  - 예1) AWS : AWS IAM
  - 예2) GCP : GCP IAM
  - 예3) Onpremise

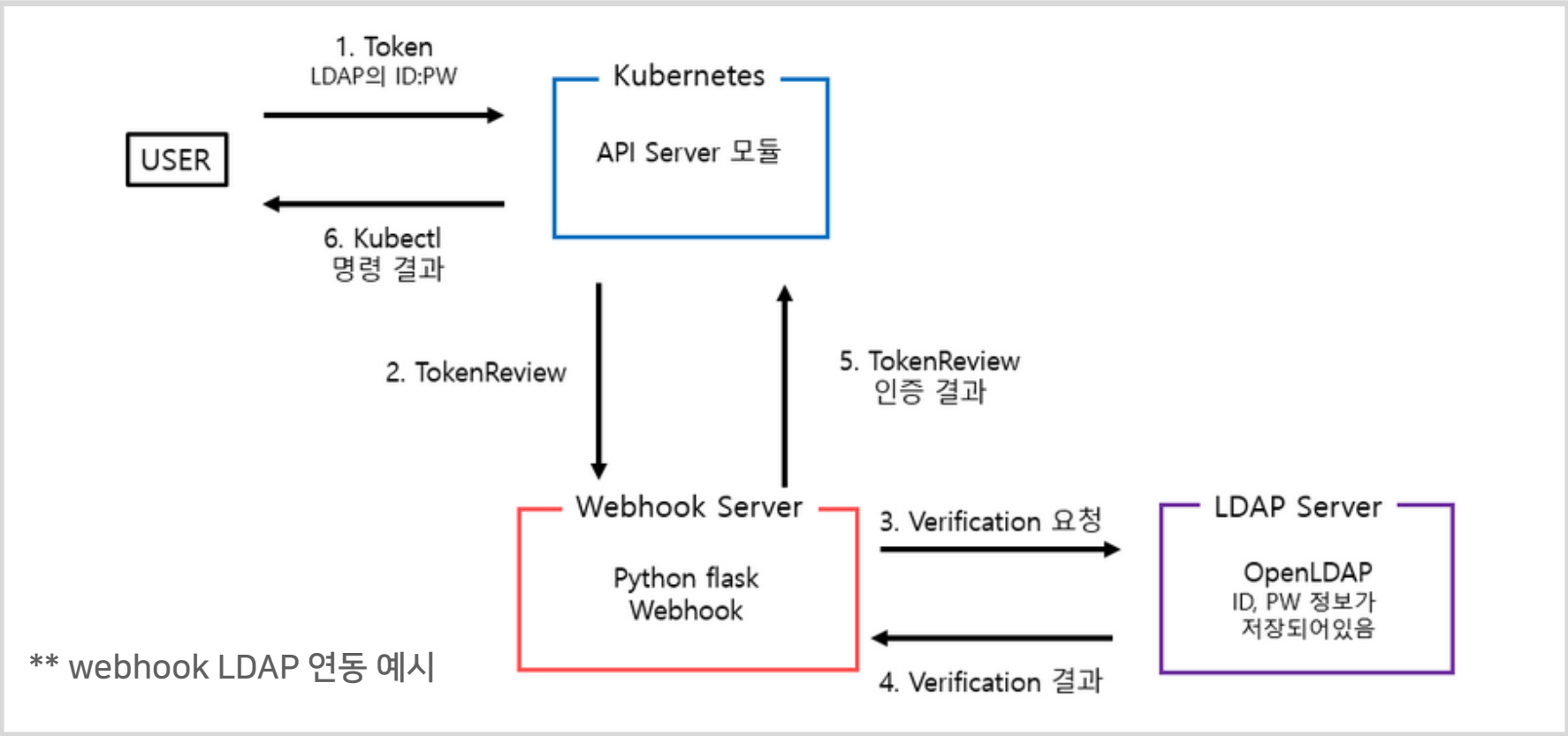
    X.509 Certificate 인증
    Webhook 외부 인증 연동, Webhook LDAP 연동
    OpenID Connector Provider

- 인증 기능은 없지만 보안주체는 존재함
  - User, Group
  - ServiceAccount

12. k8s의 인증 & 인가

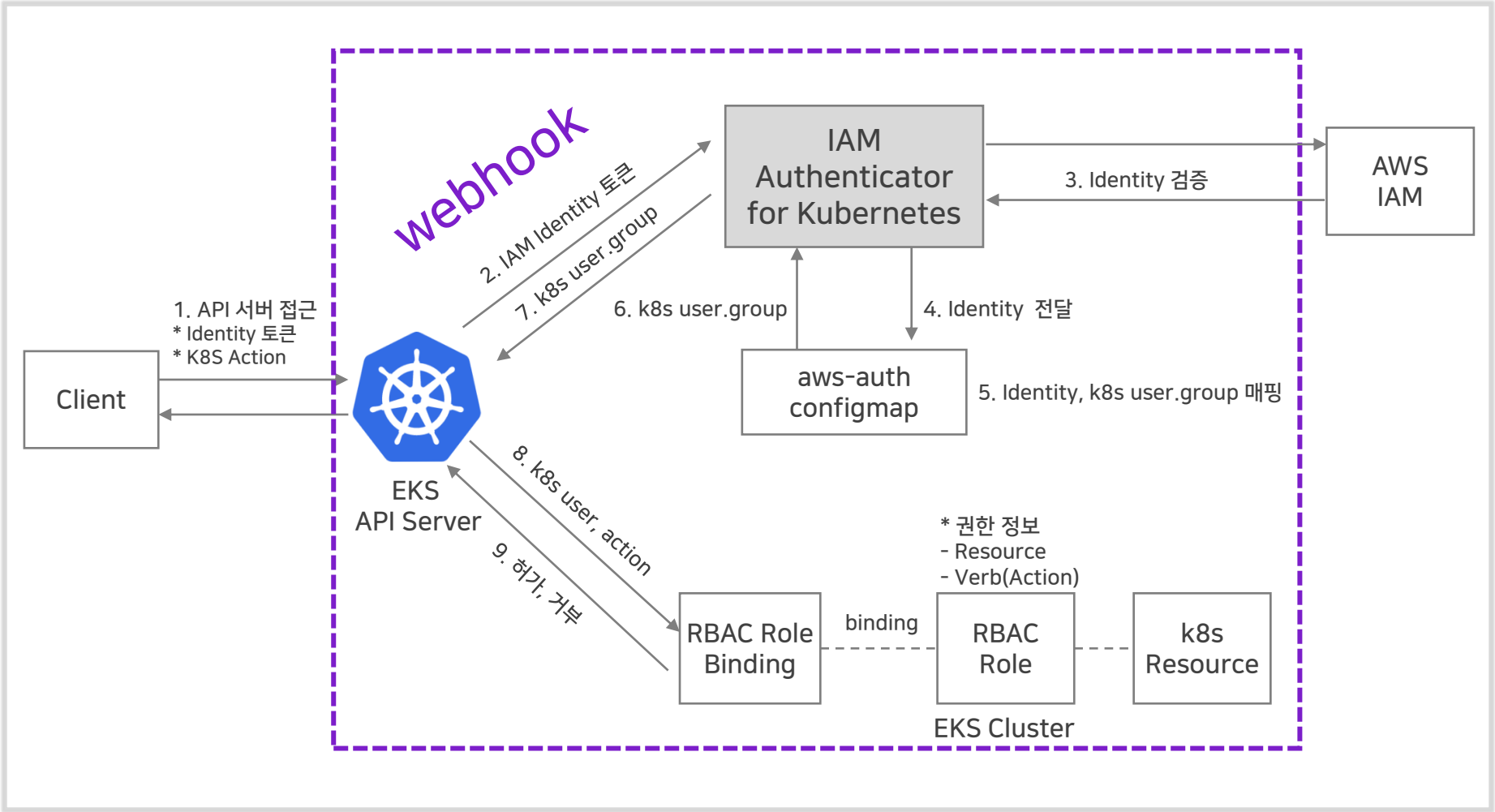
I k8s의 인가 기능

- k8s RBAC 기반 인가
- RBAC Role & Cluster Role



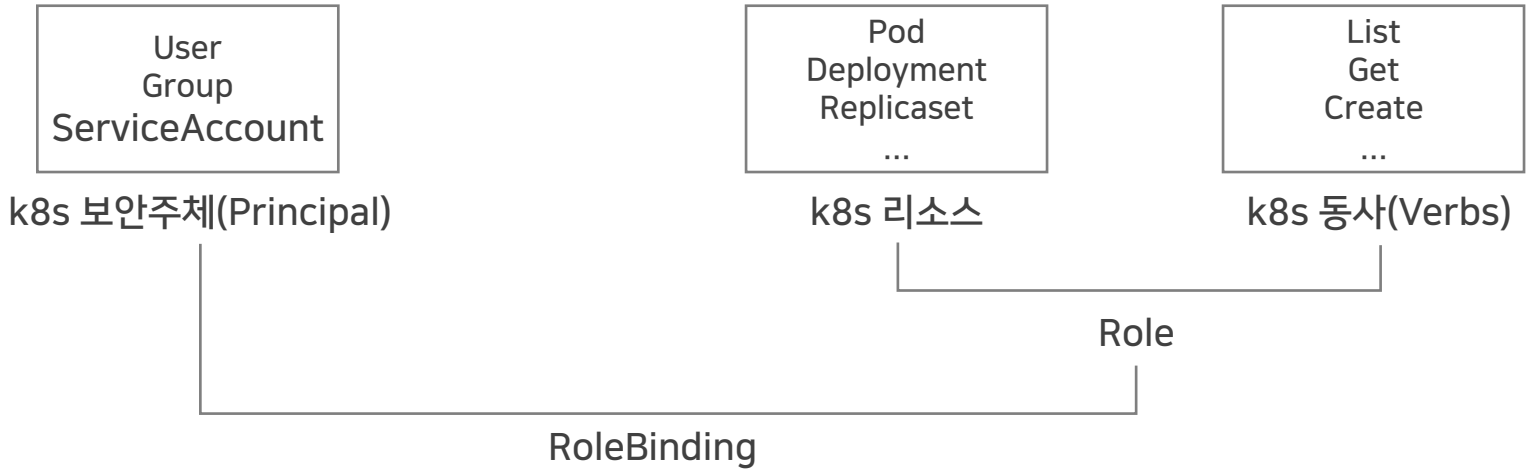
12. k8s의 인증 & 인가

I EKS의 인증 기능 - AWS IAM 연동



12. k8s의 인증 & 인가

l k8s RBAC



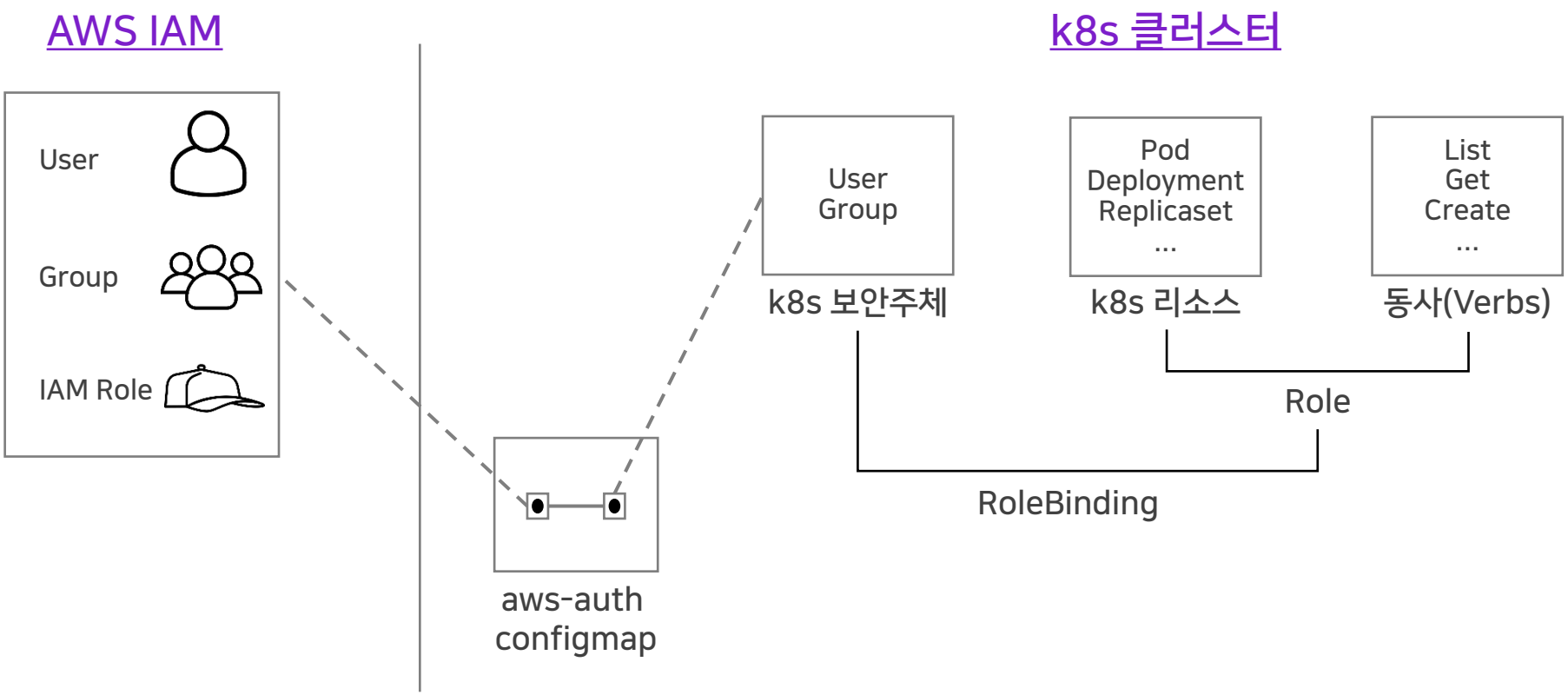
l k8s 인증,인가의 몇가지 유형

- AWS --> k8s
- k8s --> k8s
- k8s --> AWS

12. k8s의 인증 & 인가

I AWS --> k8s

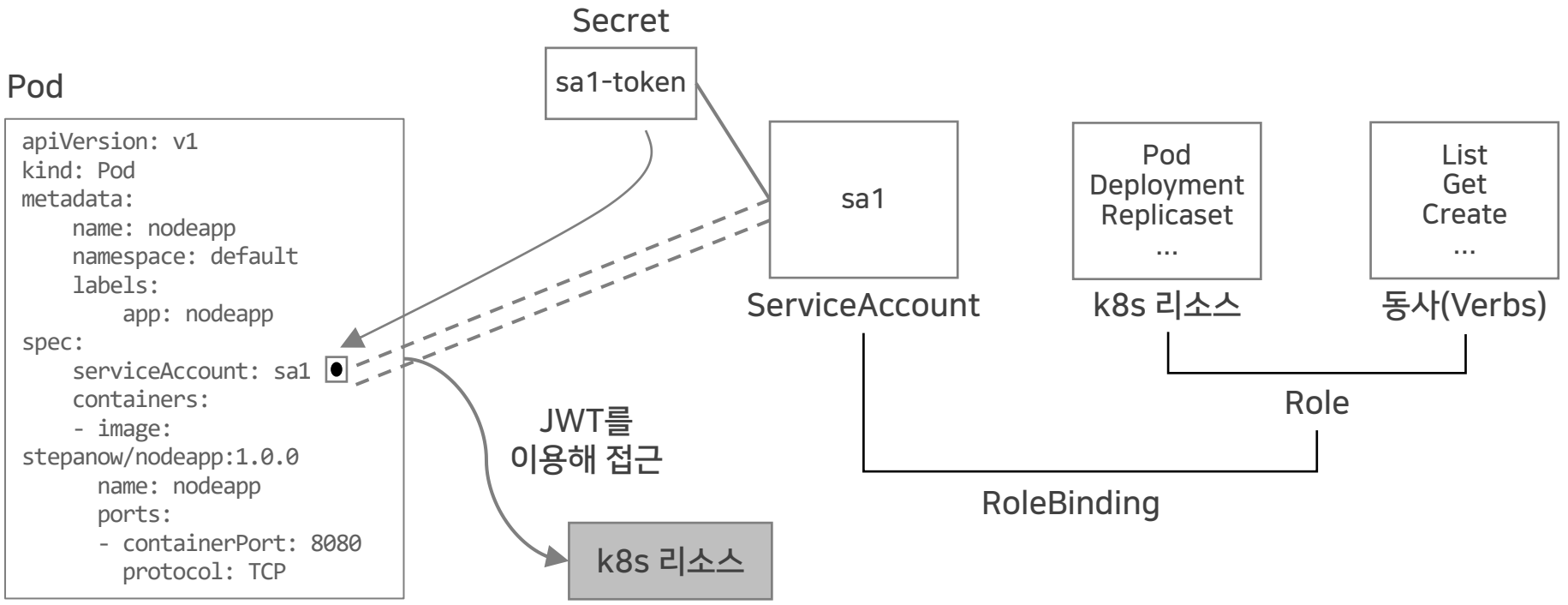
- 예 : AWS IAM Role --> k8s Pod 생성



12. k8s의 인증 & 인가

I k8s --> k8s

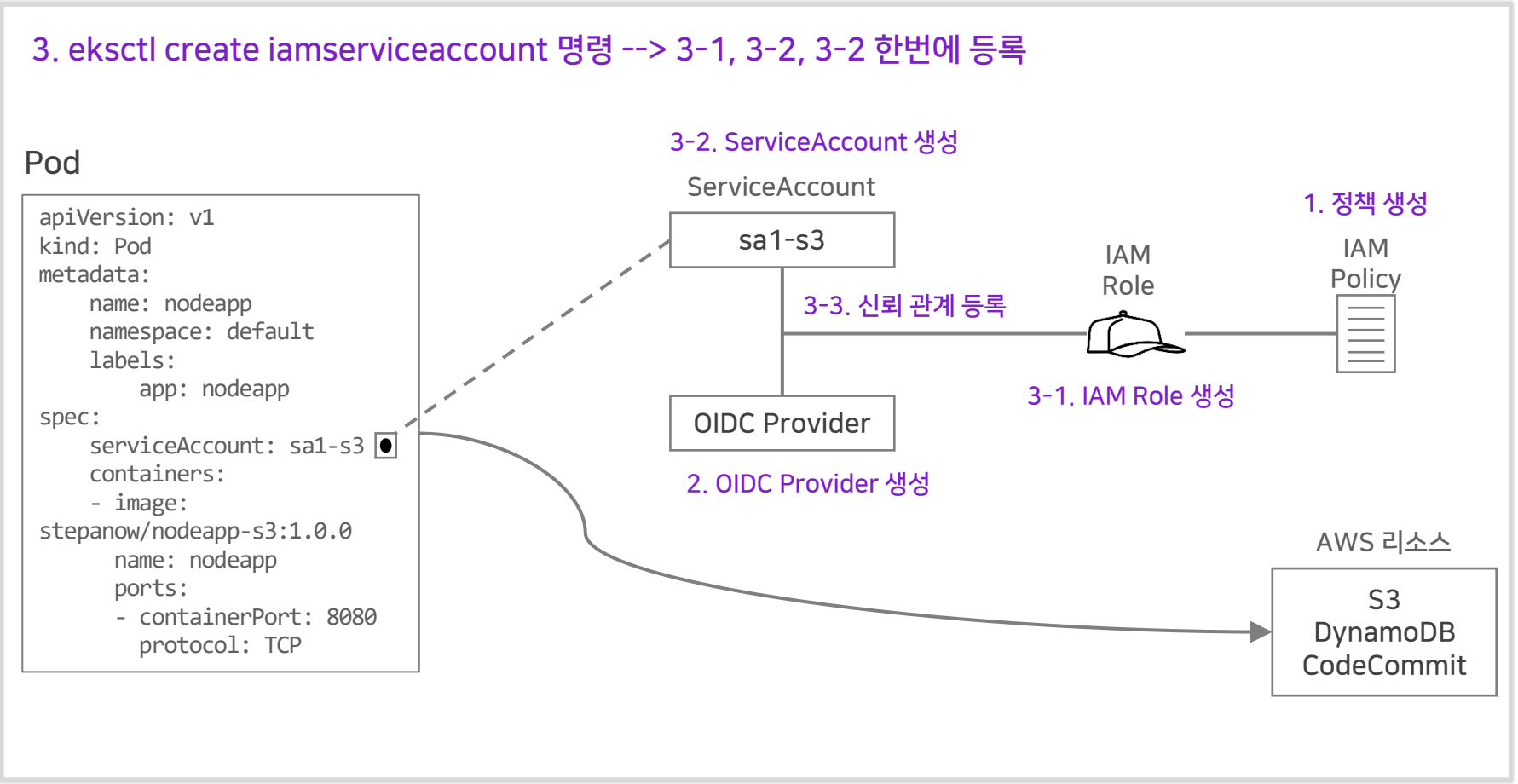
- 예) Pod 내의 애플리케이션 --> k8s Pod 생성



12. k8s의 인증 & 인가

I k8s --> AWS : IRSA(IAM Role for ServiceAccount)

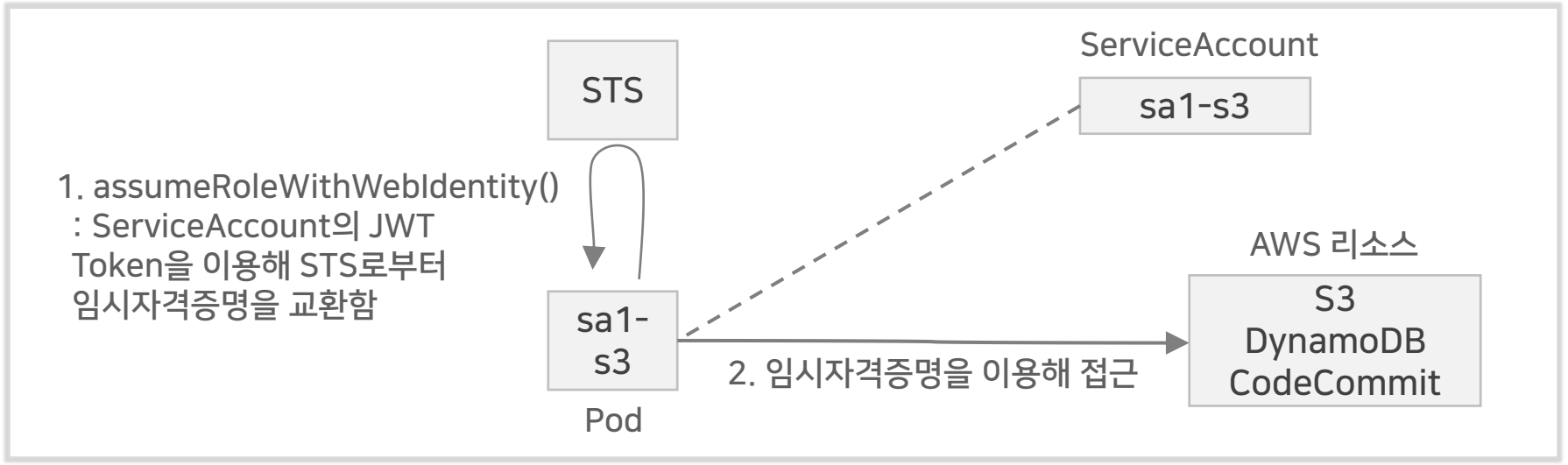
- 예) Pod 내의 애플리케이션 ---> S3와 같은 AWS 리소스 접근



13. IRSA

I IAM Role for Service Account

- ServiceAccount의 JWT를 IAM Role의 자격증명으로 교환하여 AWS 리소스에 접근 허용하는 방법
- OAuth2를 이용한 Social 인증과 유사한 메커니즘
  - Facebook 이 발급한 JWT 를 신뢰하는 엔티티로 지정한 IAM Role
  - assumeRoleWithWebIdentity() : JWT --> 임시자격증명으로 교환
- ServiceAccount의 JWT를 신뢰하는 엔티티로 이용할 수 있도록 하기 위해 OIDC Provider 등록이 필요함.



13. IRSA

I 예제 애플리케이션 소개

- stepanowon/nodeapp-s3:1.0.0 : s3 버킷의 객체 접근

```
//--- nodeapp-s3/server.js
import express from "express";
import bodyParser from "body-parser";
import os from 'os';

import { S3Client } from "@aws-sdk/client-s3";
import { GetObjectCommand  } from "@aws-
sdk/client-s3";

const app = express();

const BUCKET = "k8s-irsa-test";
const OBJECTKEY = "contacts.json";

app.use(bodyParser.json());

app.get("/", (req, res, next) => {

 res.status(200).send(`
   <div>
    <h1>nodeapp-s3</h1>
    <h2> Version: 1.0 </h2>
    <h2> 호스트명 : ${os.hostname()} </h2>
  </div>
 `)
});
```

```
app.get("/contacts", async (req, res, next) => {
 const s3Client = new S3Client({ region: "ap-northeast-2" });
 const bucketParams = { Bucket: BUCKET, Key:OBJECTKEY };

 try {
  const streamToString = (stream) =>
    new Promise((resolve, reject) => {
      const chunks = [];
      stream.on("data", (chunk) => chunks.push(chunk));
      stream.on("error", reject);
      stream.on("end", () =>
resolve(Buffer.concat(chunks).toString("utf8")));
    });

  const data = await s3Client.send(new
GetObjectCommand(bucketParams));
  const bodyContents = await streamToString(data.Body);
  res.json(bodyContents);
 } catch (err) {
   console.log("Error", err);
   res.json({ error : err.message });
 }
})

app.listen(8080, () => {
  console.log(`Server is running : PORT 80`);
});
```

13. IRSA

I IRSA 미적용 Pod로 접근 불가 확인

- kubectl apply -f pod-no-sa.yaml
  - kubectl get pods 명령으로 Pod 생성 확인
- kubectl exec -it pod-no-sa -- /bin/bash
  - curl localhost:8080 --> 액세스 성공
  - curl localhost:8080/contacts --> 액세스 거부
- 테스트 완료 후 Pod 삭제
  - kubectl delete pods pod-no-sa

```
## pod-no-sa.yaml
apiVersion: v1
kind: Pod
metadata:
    name: pod-no-sa
    labels:
      app: nodeapp
spec:
  containers:
  - image: stepanow/nodeapp-s3:1.0.0
    imagePullPolicy: Always
    name: nodeapp
    ports:
    - containerPort: 8080
```

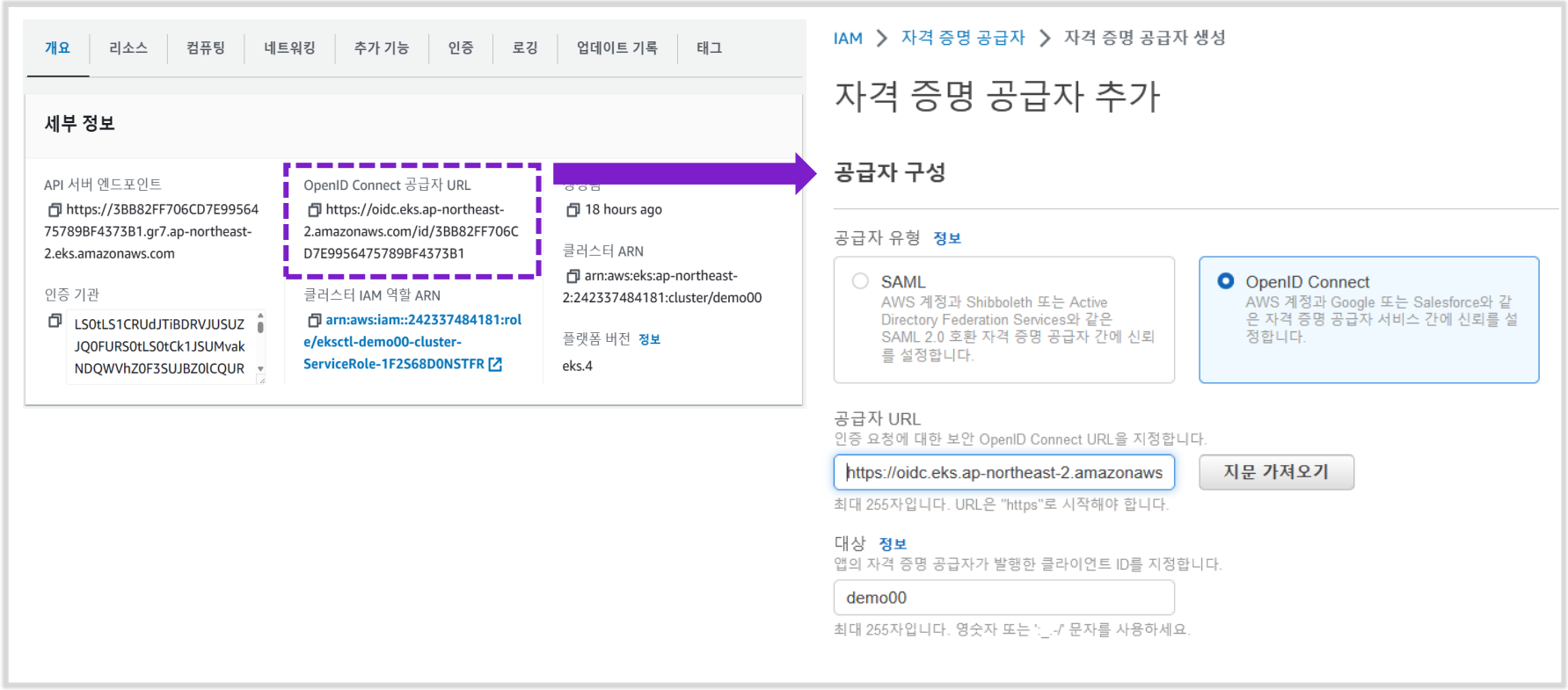
```
user00:~/environment/eks/serviceaccount/irsa $ kubectl apply -f pod-no-sa.yaml
pod/pod-no-sa created
user00:~/environment/eks/serviceaccount/irsa $ kubectl get pods
NAME        READY   STATUS    RESTARTS   AGE
pod-no-sa   1/1     Running   0          8s
user00:~/environment/eks/serviceaccount/irsa $ kubectl exec -it pod-no-sa -- /bin/bash
root@pod-no-sa:/usr/src/app# curl localhost:8080

   <div>
    <h1>nodeapp-s3</h1>
    <h2> Version: 1.0 </h2>
    <h2> 호스트명 : pod-no-sa </h2>
  </div>
 root@pod-no-sa:/usr/src/app# curl localhost:8080/contacts
{"error":"Access Denied"}root@pod-no-sa:/usr/src/app#
root@pod-no-sa:/usr/src/app#
```

13. IRSA

I OIDC Provider 생성 방법 1

- OIDC Provider URL 확인 후 IAM에서 OIDC Provider 등록



13. IRSA

I OIDC Provider 생성 방법 2

- eksctl utils associate-iam-oidc-provider --cluster demoNN --approve

I IAM Policy 검토(EKSPodToS3Policy)

- arn:aws:iam::111122223333:policy/EKSPodToS3Policy

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "s3:GetObject"
            ],
            "Resource": [
                "arn:aws:s3:::k8s-irsa-test/*"
            ]
        }
    ]
}
```

13. IRSA

eksctl create iamserviceaccount 명령

- 입력 : IAM Policy, ServiceAccount명, 클러스터
- 생성 : ServiceAccount, IAM Role, 신뢰관계 --> 6페이지 전 그림 참조
- 다음 명령에서 bold 처리된 부분만 변경

```
eksctl create iamserviceaccount \
  --name sa1-s3-demoNN \
  --namespace default \
  --cluster demoNN \
  --attach-policy-arn arn:aws:iam::111122223333:policy/EKSPodToS3Policy \
  --approve \
  --override-existing-serviceaccounts
```

ServiceAccount, Token 확인

- kubectl get sa sa1-s3-demoNN
- kubectl create token sa1-s3-demoNN

```
user00:~/environment/eks/serviceaccount/irsa $ kubectl get sa sa1-s3-demo00
NAME           SECRETS   AGE
sa1-s3-demo00   0         6m29s
user00:~/environment/eks/serviceaccount/irsa $ kubectl create token sa1-s3-demo00
eyJhbGciOiJSUzI1NiIsImtpZCI6ImFjMDJjNTAwYzcxZTdmMDUyOWVlMGYxYTkxMTczODlmMzZhNWI5MjC
F1bHQuc3ZjIl0sImV4cCI6MTY4NjI3NDc0NCwiaWF0IjoxNjg2MjcxMTQ0LCJpc3MiOiJodHRwczovL29pZ
vaWQvM0JCODJGRjcwNkNEN0U5OTU2NDc1Nzg5QkY0MzczQjEiLCJrdWJlcm5ldGVzLmlvIjp7Im5hbWVzC
YW1lIjoic2ExLXMzLWRlbW8wMCIsInVpZCI6ImJmNDUyODdiLWM3NDAtNGMyYi04NGY3LWMzY2M2OTQwYWE
W06c2VydmljZWFjY291bnQ6ZGVmYXVsdDpzYTEtczMtZGVtbzAwIn0.Gdgjnt3F07iexXkg1fu35EYB4sdV
ENRHNQPUpkAz82ifI2401bEBKJDKzB2PN7a5QmM2MOD1KLeorguPYBkM58LfRtaKO5646uop4u_uD-8FlbN
oO26Aty0d113dYBT6-E89bKRDcC1D8wmx9Zy-W70lDXEWCFUMKK4SJj-FGoh2WMY8b4YSmPWZMpCP95Kd_K
r7u6Cjd6Zg
```

13. IRSA

Ⅰ Service Account를 사용하는 Pod 생성 후 접근 여부 확인

- kubectl apply -f pod-sa.yaml
- kubectl exec -it pod-sa -- /bin/bash
- 다음 명령 실행 : 둘 다 성공
  - curl localhost:8080
  - curl localhost:8080/contacts

```
user00:~/environment/eks/serviceaccount/irsa $ kubectl apply -f pod-sa.yaml
pod/pod-sa created
user00:~/environment/eks/serviceaccount/irsa $ kubectl exec -it pod-sa -- /bin/bash
root@pod-sa:/usr/src/app# curl localhost:8080

   <div>
    <h1>nodeapp-s3</h1>
    <h2> Version: 1.0 </h2>
    <h2> 호스트명 : pod-sa </h2>
  </div>
 root@pod-sa:/usr/src/app# curl localhost:8080/contacts
"{ \r\n  \"contacts\": [\r\n\t {\"no\":1569603605606,\"name\":\"Keandra Lee\",\"tel\":\"010
-3456-8299\",\"address\":\"서울시\" },\r\n\t {\"no\":1569603605605,\"name\":\"Katherine Whi
te\",\"tel\":\"010-3456-8298\",\"address\":\"서울시\" },\r\n\t {\"no\":1569603605604,\"name
\":\"Katchi Wilson\",\"tel\":\"010-3456-8297\",\"address\":\"서울시\" },\r\n\t {\"nroot@pod
```

```
## pod-sa.yaml
apiVersion: v1
kind: Pod
metadata:
    name: pod-sa
    labels:
      app: nodeapp
spec:
  serviceAccountName: sa1-s3-demoNN
  containers:
  - image: stepanow/nodeapp-s3:1.0.0
    imagePullPolicy: Always
    name: nodeapp
    ports:
    - containerPort: 8080
```

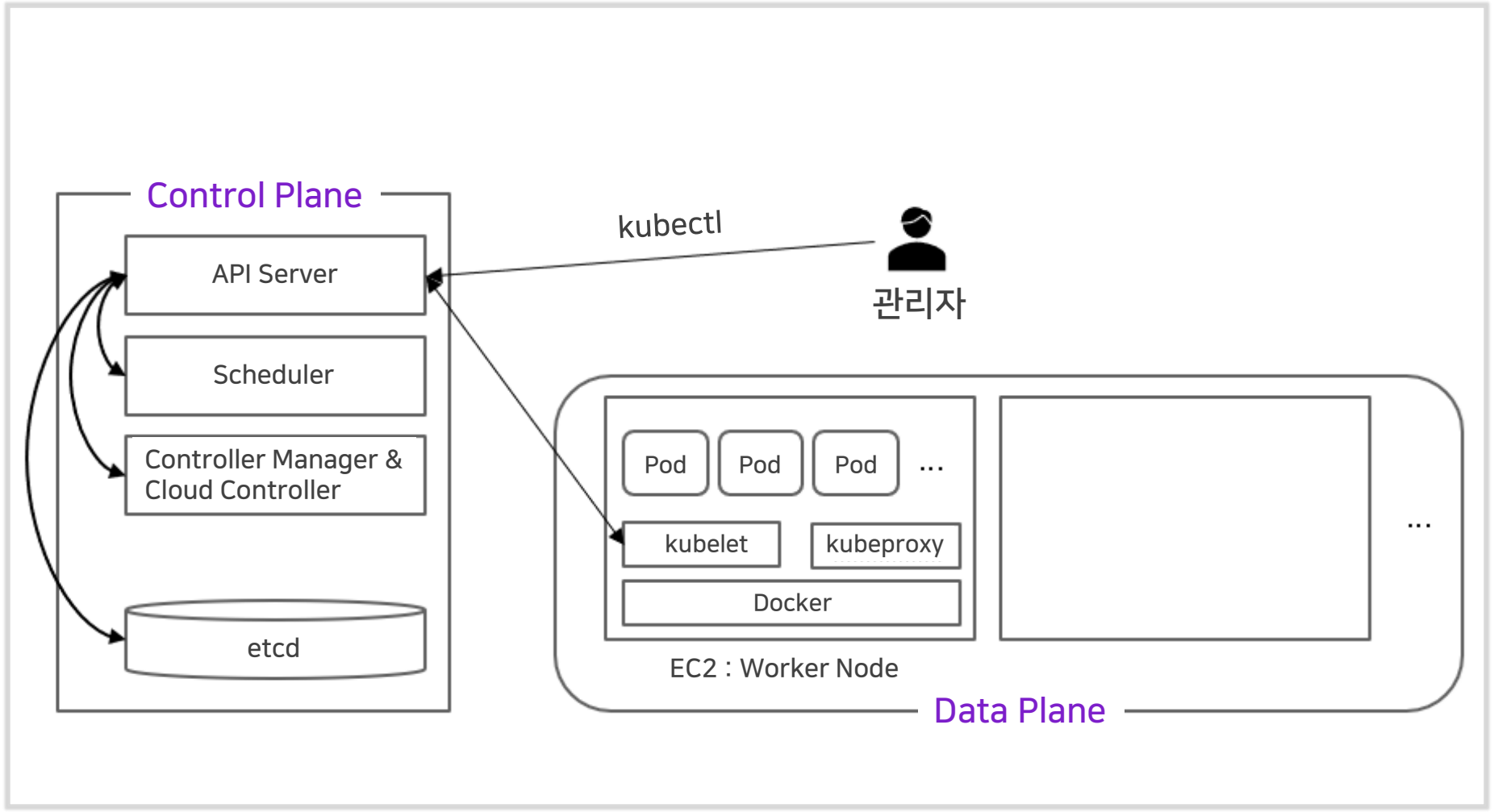
13. IRSA

I 리소스 정리

- kubectl delete -f pod-no-sa.yaml
- kubectl delete -f pod-sa.yaml
- eksctl delete iamserviceaccount --cluster demoNN --name sa1-s3-demoNN

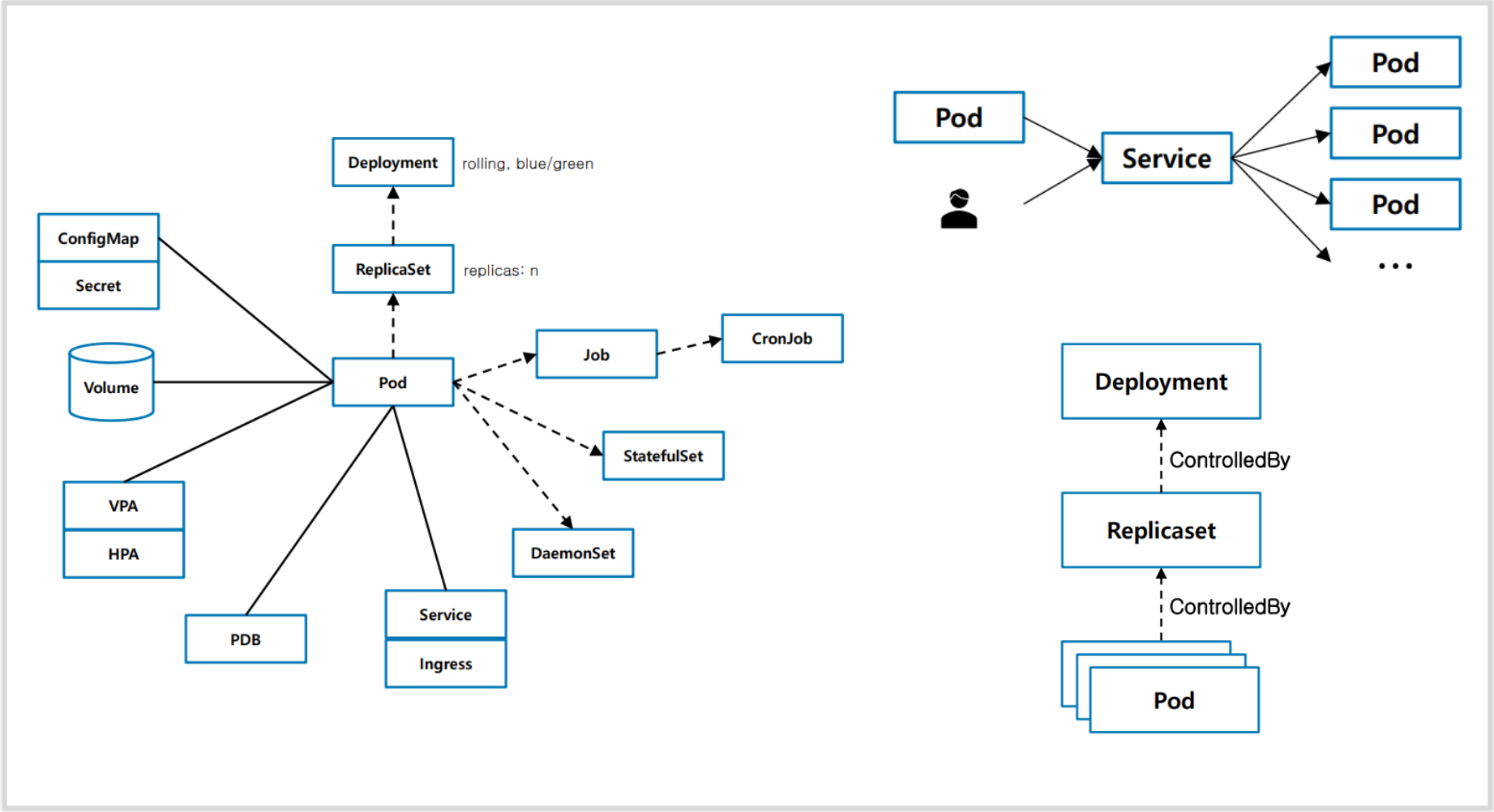
* 내용 정리

I Container Orchestration 도구 --> 대표적인 예가 k8s



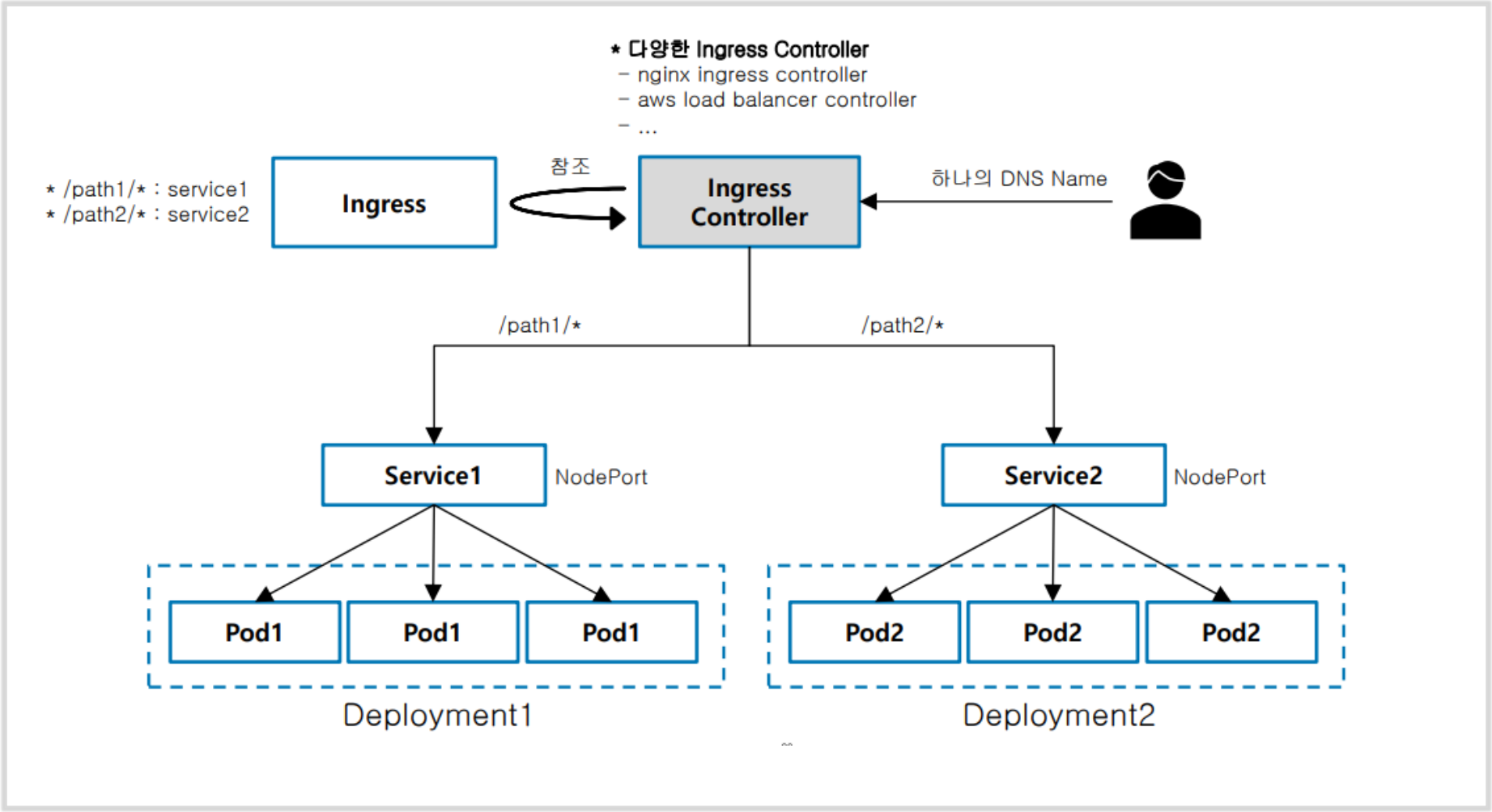
* 내용 정리

I k8s 리소스 객체



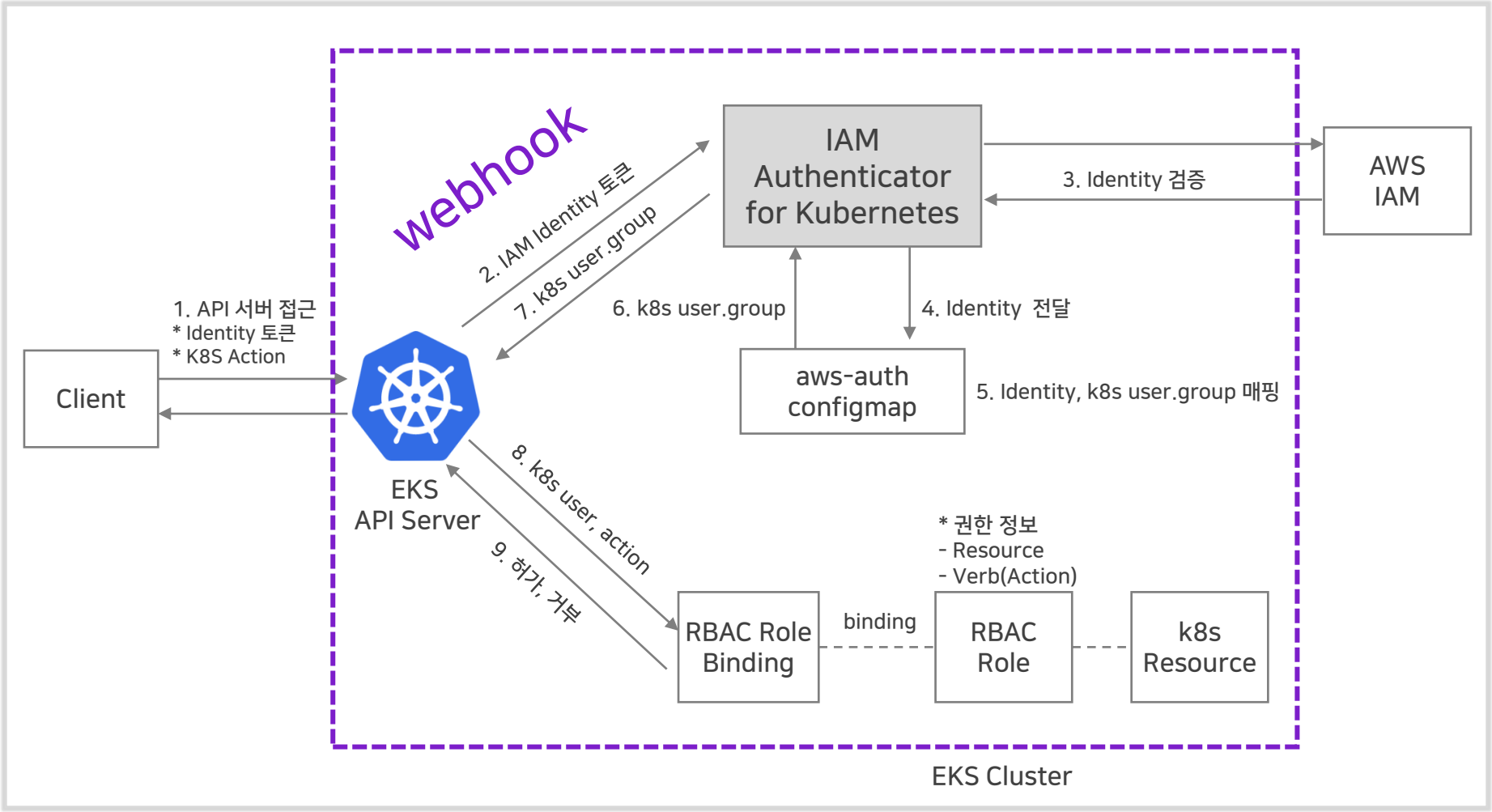
* 내용 정리

I Ingress



* 내용 정리

I 인증 및 인가 1



* 내용 정리

I 인증 및 인가 2 : IRSA