**Services**

* Cluster ip
* Noteport
* Loadbalancer
* External name
* Headless service -used for statefull process/pods connection -cant proxy but creates a sticky connection through DNS assigned to the pod

**Ingress controller** - to connect with external ip - not applicable for KIND(local) clusters caz there is no external ip assigned - in real time when a ingress controller is created, a ingress service(load balancer) is created so it will be assigned ip from a AWS loadbalancer

What if you have multiple ingress controller inside your cluster ?? --you mention in ingress class inside you ingress.yaml --rare case

Every pod must have ingress

**Annotations:**

are **key-value pairs** that you can attach to objects to store non-identifying metadata. They don’t affect the object's core behavior directly—but controllers (like the **Ingress controller**) can use them to customize behavior.

**In the context of Ingress, annotations are used to:**

✔️ **Tell the Ingress controller** how to handle advanced behaviors like:

* Load balancing rules
* SSL redirection
* Path rewrites
* Authentication
* Rate limiting
* WAFs (Web Application Firewalls)

Think of it like this:

**Ingress + annotations = custom instructions for your Ingress controller**

**Network policies** - to restrict allow/deny traffic - works in calico CNI and doesn’t work in kindnet CNI - install CNI and now ingress will not work in kind cluster

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| --- | --- | --- | --- |
| **ALB** |  | **Nginx** |  |
| **Load balancers** |  |  |  |
| **Key** | **Values** | **Key** | **Values** |
| alb.ingress.kubernetes.io/scheme | internet-facing or internal | nginx.ingress.kubernetes.io/upstream-hash-by | $request\_uri, $host, etc. |
| alb.ingress.kubernetes.io/target-type | Ip or instance | nginx.ingress.kubernetes.io/load-balance | round\_robin, least\_conn, ip\_hash |
| alb.ingress.kubernetes.io/backend-protocol | HTTP, HTTPS, GRPC |  |  |
| alb.ingress.kubernetes.io/load-balancer-attributes | key1=value1,key2=value2(ex: access\_logs.s3.enabled=true) |  |  |
| **SSL / HTTPS** |  |  |  |
| **Key** | **Values** | **Key** | **Values** |
| alb.ingress.kubernetes.io/certificate-arn | ARN of ACM cert | nginx.ingress.kubernetes.io/ssl-redirect | "true"or "false" |
| alb.ingress.kubernetes.io/ssl-redirect | '443'to force HTTPS | nginx.ingress.kubernetes.io/ssl-passthrough | "true"to pass TLS to backend |
| alb.ingress.kubernetes.io/listen-ports | JSON like [{ "HTTP": 80, "HTTPS": 443 }] | nginx.ingress.kubernetes.io/backend-protocol | HTTPS, GRPC |
| alb.ingress.kubernetes.io/ssl-policy | ELBSecurityPolicy-2016-08, ELBSecurityPolicy-TLS-1-2-Ext-2018-06, etc. |  |  |
| **Routing / Rewrite** |  |  |  |
| **Key** | **Values** | **Key** | **Values** |
| alb.ingress.kubernetes.io/actions.${service} | JSON to define rewrite, forward, redirect actions | nginx.ingress.kubernetes.io/rewrite-target | e.g. /or /something |
| alb.ingress.kubernetes.io/conditions.${service} | Path/host matching conditions |  |  |
| **Auth & Cognito** |  |  |  |
| **Key** | **Values** | **Key** | **Values** |
| alb.ingress.kubernetes.io/auth-type | Cognito or oidc | nginx.ingress.kubernetes.io/auth-type | basic |
| alb.ingress.kubernetes.io/auth-idp-cognito | JSON with Cognito user pool details | nginx.ingress.kubernetes.io/auth-secret | Name of secret with .htpasswd |
| alb.ingress.kubernetes.io/auth-scope | OAuth scopes | nginx.ingress.kubernetes.io/auth-realm | Realm name |
| alb.ingress.kubernetes.io/auth-session-cookie | Name of session cookie |  |  |
| alb.ingress.kubernetes.io/auth-session-timeout | Timeout in seconds |  |  |
| **Security / WAF - Nginx /rate limiting** |  |  |  |
| **Key** | **Values** | **Key** | **Values** |
| alb.ingress.kubernetes.io/waf-acl-id | ID of WAFv2 WebACL | nginx.ingress.kubernetes.io/limit-connections | integer |
| alb.ingress.kubernetes.io/security-groups | Comma-separated SGs | nginx.ingress.kubernetes.io/limit-rpm | Requests per minute |
| alb.ingress.kubernetes.io/subnets | Comma-separated Subnet IDs (optional override) | nginx.ingress.kubernetes.io/limit-rps | Requests per second |