### EKS Auto Mode: Behind the Curtain

Eric Bailey

Kubernetes Slovenia 16th April 2025 ENS A

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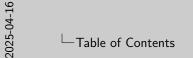
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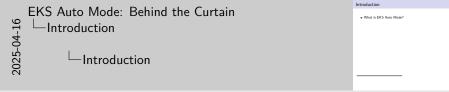
Briefly mention how it's presented as a turnkey or magic solution to the problem of managing Kubernetes, and that we're going to "look behind the curtain."

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• What is EKS Auto Mode?



1. It's basically vanilla EKS with some common add-ons, including highly opinionated or restrictive installations of the AWS VPC CNI and Karpenter.

 What is EKS Auto Mode?
 "Amazon EKS Auto Mode fully automates Kubernetes cluster management for compute, storage, and networking on AWS with a single click."



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- 4. What's covered by AWS Support is sensibly minimal, and it's slightly prescriptive, e.g., feature flags, blessed CNIs, etc.

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"Amazon Elastic Kubernetes Service (Amazon EKS) is the premiere platform for running Kubernetes clusters, both in the Amazon Web Services (AWS) cloud and in your own data centers (EKS Anywhere and Amazon EKS Hybrid Nodes)."<sup>2</sup>

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## kOps - Kubernetes Operations

kOps provides several managed add-ons, configurable through the cluster spec, as well as the means to specify custom static add-ons.<sup>4</sup>



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## kOps - Kubernetes Operations

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For example, Cluster Autoscaler<sup>5</sup> can be configured as follows.

```
spec:
  clusterAutoscaler:
    enabled: true
    # ...
```

EKS Auto Mode: Behind the Curtain kOps - Kubernetes Operations

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For example, Cluster Autoscaler<sup>5</sup> can be configured as follows.

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Managed add-ons will be upgraded following the kOps and Kubernetes lifecycle, and are configured based on the cluster spec<sup>6</sup>.

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EKS Auto Mode: Behind the Curtain kOps - Kubernetes Operations

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- CNI<sup>7</sup>
- CoreDNS
- kube-proxy

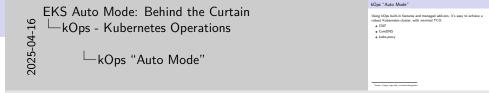
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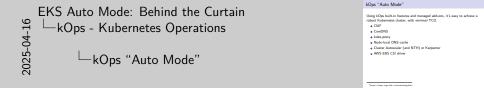
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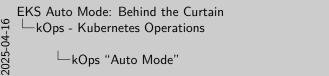
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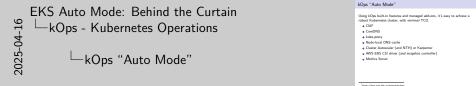


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- 4. Not possible to configure two instances of CoreDNS add-on.
- 5. Metrics Server and cert-manager are community add-ons.
- 6. Pod identity webhook "for free".
- 7. Need to DIY LBC.

<sup>&</sup>lt;sup>8</sup>Sane defaults, optionally managed lifecycle, backed by E2E testing by Amazon.

<sup>9</sup>https://aws-ia.github.io/terraform-aws-eks-blueprints/

EKS Auto Mode

EKS Auto Mode

<sup>10 ...</sup> assuming the right options are specified.

<sup>11</sup>https://docs.aws.amazon.com/eks/latest/userguide/automode.html#\_automated\_components

AWS VPC CNI

EKS Auto Mode: Behind the Curtain -EKS Auto Mode

Out of the box10, EKS Auto Mode supports the following automated AWS VPC CNI

EKS Auto Mode

EKS Auto Mode

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Out of the  $box^{10}$ , EKS Auto Mode supports the following automated components<sup>11</sup>.

• AWS VPC CNI (with caveats)

EKS Auto Mode: Behind the Curtain LEKS Auto Mode

EKS Auto Mode

EKS Auto Mode

Out of the low<sup>10</sup>, EKS Auto Mode supports the following automated components<sup>12</sup>.

• AMS VPC CIII (with caveals)

- 1. EKS Auto Mode does not support warm IP, warm prefix, or warm ENI configurations.
- 2. Instead of ds/aws-node it's implemented as a systemd unit that can't be reconfigured.
- 3. tl;dr custom networking is not supported.

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Out of the box $^{10}$ , EKS Auto Mode supports the following automated components $^{11}$ .

- AWS VPC CNI (with caveats)
- Karpenter

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Out of the bas<sup>10</sup>, ESS Acto Mode supports the following automated a ANS VPC CNI (with casessis)

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- 4. Auto Mode comes with NodePools general-purpose and platform (tainted CriticalAddonsOnly:NoSchedule).
- 5. Default NodePools dont' support SSH and such.
- 6. You can add your own NodePools, but probably don't wanna have different CNI configs.

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Out of the box<sup>10</sup>, EKS Auto Mode supports the following automated components<sup>11</sup>.

- AWS VPC CNI (with caveats)
- Karpenter (with default and custom NodePools and NodeClasses)

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EKS Auto Mode: Behind the Curtain FKS Auto Mode

FKS Auto Mode

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- AWS VPC CNI (with caveats)
- Karpenter (with default and custom NodePools and NodeClasses)
- CoreDNS
- Security patches, OS and component upgrades

EKS Auto Mode: Behind the Curtain LEKS Auto Mode

EKS Auto Mode

EKS Auto Mode

Out of the base<sup>10</sup>, EKS Auto Mode supports the following autor

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- 8. "EKS Auto Mode enforces a 21-day maximum node lifetime to ensure up-to-date software and APIs."

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- CoreDNS
- Security patches, OS and component upgrades
- Pod Identity Webhook

EKS Auto Mode: Behind the Curtain LEKS Auto Mode

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• Socially patients, OS and component upgrades
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- AWS VPC CNI (with caveats)
- Karpenter (with default and custom NodePools and NodeClasses)
- CoreDNS
- Security patches, OS and component upgrades
- Pod Identity Webhook
- AWS Load Balancer controller<sup>12</sup>

EKS Auto Mode: Behind the Curtain LEKS Auto Mode

EKS Auto Mode

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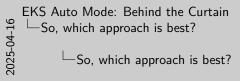
<sup>11</sup>https://docs.aws.amazon.com/eks/latest/userguide/automode.html#\_automated\_components

<sup>&</sup>lt;sup>12</sup>There is no migration path for existing load balancers.

So, which approach is best?

# So, which approach is best?

It depends. $^{^{\mathsf{TM}}}$ 



So, which approach is best?

# Thank you! 🙇



☐But actually...

But actually...

Here are some criteria to rule out EKS Auto Mode as a viable option.

• Need custom networking?

∟But actually...

But actually.

But actually...

Here are some criteria to rule out EKS Auto Mode as a viable option.

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  - CIDR Block."13

<sup>13</sup>The documentation is misleading and contradictory, YMMV.

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1. Mention our IPAM cost drivers deep dive.

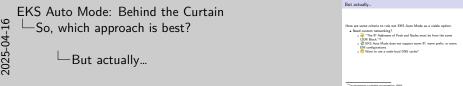
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Here are some criteria to rule out EKS Auto Mode as a viable option.

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  - Want to use a node-local DNS cache?



- 1. Mention our IPAM cost drivers deep dive.
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# But actually...

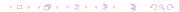
Here are some criteria to rule out EKS Auto Mode as a viable option.

- Need custom networking?

  - Want to use a node-local DNS cache?
- Have an existing EKS cluster?



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# But actually...

Here are some criteria to rule out EKS Auto Mode as a viable option.

- Need custom networking?

  - Want to use a node-local DNS cache?
- Have an existing EKS cluster?
  - Can't tolerate downtime for existing load balancers?



- 1. Mention our IPAM cost drivers deep dive.
- 2. Custom configuration is supported, but likely would need to be added after initial cluster provisioning.



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## Feature Comparsion

Comparing the high-level features					
	EKS Auto Mode	EKS	kOps		
Nodes	1		V		
Autoscaling	<b>V</b>	À			
Upgrades	<b>V</b>		À		
Load balancing	1				
Storage	V				
Networking	X	À			
IAM	<b>✓</b>				
AMI/OS	X	V			

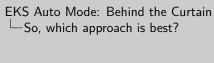
EKS Auto Mode: Behind the Curtain \_\_\_So, which approach is best?

Feature Comparsion



- 1. EKS Auto Mode uses their custom Bottlerocket AMI.
- 2. I haven't tested GPU workloads. They're supposed to work, but NVIDIA is gonna NVIDIA...
- 3. On EKS and kOps you can use pretty much anything, so long as you have a compatible kubelet, but Karpenter is getting increasingly prescriptive, which is not inherently bad.

 $<sup>^{14} {\</sup>rm https://docs.aws.amazon.com/eks/latest/userguide/automode.html\#\_features} \quad \underbrace{\text{ } \bigcirc \text{ } \rightarrow \text{ } \bigcirc \text{ }$ 





Slides available on GitHub:



