

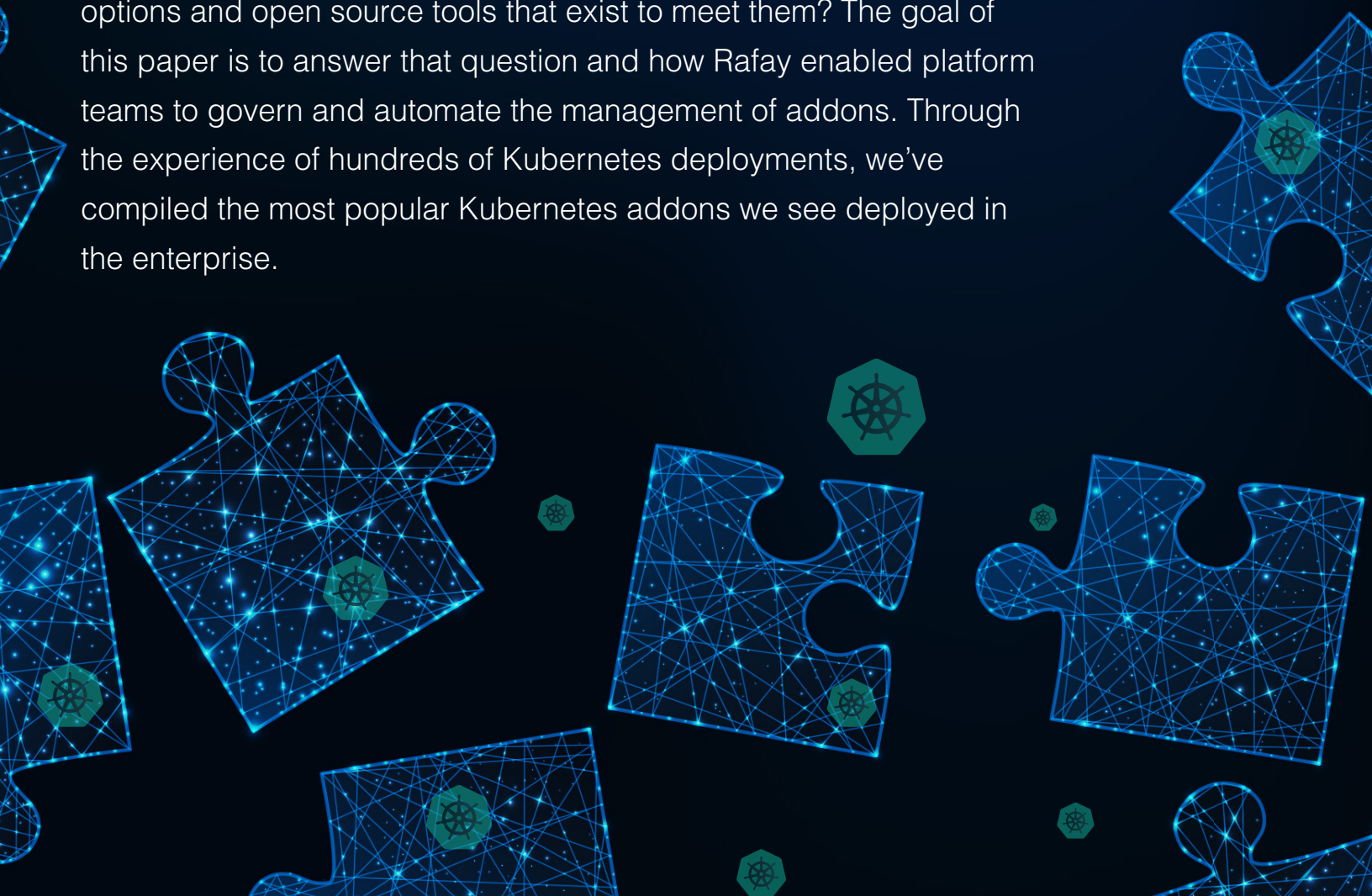
The Top Kubernetes Software Addons in the Enterprise

WHITE PAPER

Introduction

Procuring a Kubernetes cluster is a relatively easy task. However, running your applications on top of Kubernetes in a production environment requires much more effort. While Kubernetes is a very powerful orchestration layer, it does have a number of missing pieces that are necessary for broader adoption in an enterprise. The good news is that Kubernetes is extensible and there are specifically designed addons that extend the functionality of Kubernetes which will make the lives of platform, developers and operations teams easier.

But which addons do you choose given the dozens of enterprise requirements and the hundreds of technologies, vendor software options and open source tools that exist to meet them? The goal of this paper is to answer that question and how Rafay enabled platform teams to govern and automate the management of addons. Through the experience of hundreds of Kubernetes deployments, we've compiled the most popular Kubernetes addons we see deployed in the enterprise.



The Top Kubernetes Addons

Below are the most popular Kubernetes addons across the top categories compiled from a survey of over 100 enterprises.

CI/CD	 GitLab	 Jenkins	 circleci	 argo	 flux	
Secrets Management	 AWS Secrets Manager	 Azure Key Vault	 Vault	 CYBERARK®		
Ingress	 NGINX PART OF F5	 Kong	 traefik	 HAPROXY	 Istio	 Gloo
Security	 paloalto® networks	 sysdig	 orca security	 aqua	 LACEWORK	
Service Mesh	 Istio	 LINKERD	 Consul	 solo.io		
Networking	 PROJECT CALICO	 cilium	 flannel	 MULTUS		
Machine Learning	 Kubeflow	 Apache Airflow	 jupyter			
Observability	 Prometheus	 Grafana Labs	 DATADOG	 new relic.	 dynatrace	
Policy Management	 Open Policy Agent	 styra	 Kyverno			
Analytics/ Logging	 DATADOG	 elastic	 splunk>	 fluentd	 sumo logic	
Cost Management	 kubecost	 cast				
Storage	 ROOK	 ceph	 OpenEBS	 portworx by Pure Storage		
Backup	 VELERO	 veeAM	 kasten	 NetApp®		

Thanks to the popularity of Kubernetes, an array of tools now integrated with Kubernetes to improve the function and effectiveness of clusters and the workloads running on them. However, as you may have deduced from reviewing such a long list above, addons can add a significant level of integration work and management overhead especially as varying workload requirements expand and numerous addons require patches and upgrades over time.

Managing the Lifecycle of Kubernetes Cluster Addons

Enterprises with a fleet of Kubernetes clusters need capabilities to ensure that their clusters are always compliant with internal policies and have a certain baseline set of addons as required for developers. For example, consider a global financial services organization with 10-20 Kubernetes clusters. They may require some of their clusters to comply with the Payment Card Industry (PCI) standard and some of their clusters may be under the purview of GDPR.

Another example of a popular issue is an increase in snowflake clusters as the fleet grows. Snowflake clusters are clusters that change over time (usually in production) without proper approval and thus no longer comply with internal standards set by the platform team. When this happens, the time and costs involved to support clusters increases significantly, as does MTTR. To combat these issues, Rafay's Blueprint and Drift Detection Service feature helps platform teams manage and enforce the use of a curated set of cluster configurations available for self-service by developers, QA, or operations/SRE teams.

Using Cluster Blueprints in Rafay's Kubernetes Operations Platform

It is extremely challenging, operationally cumbersome, and error-prone to manage and govern the lifecycle of addons manually, especially as the number of clusters grows. Rafay's cluster blueprinting capabilities are focused on addressing this challenge.

All Cluster Blueprints consist of one or more software addons. Administrators can assemble one or more addons to create a Cluster Blueprint. With Rafay, enterprises can create and manage the following types of Cluster Blueprints and options:

DEFAULT BLUEPRINT	MINIMAL BLUEPRINT	CUSTOM BLUEPRINT	GOLDEN BLUEPRINT	BLUEPRINT EXCEPTIONS
The default cluster blueprint is the baseline for any cluster. Default Blueprints are version controlled. These are remotely updated when patches or upgrades are necessary.	For remote or edge use cases Rafay provides a customizable minimal blueprint.	Enterprises can create and manage custom cluster blueprints by adding addons to the default cluster blueprints. It is important to emphasize that this builds on or extends the Default Blueprint and does not replace it.	Golden cluster blueprints are an extension of Default Blueprints and can be used to create/enforce a baseline set of addons/policies. Users can use it as a base blueprint for any new custom blueprint/versions or simply deploy Golden Blueprints to clusters.	Any cluster blueprint can have addon exceptions defined and used in custom situations.

The entire history of Cluster Blueprint versions is maintained on the Rafay KOP. Once a custom Cluster Blueprint has been created, it can be used during initial provisioning or applied to existing clusters. Blueprints can be created centrally and shared across projects ensuring the entire enterprise—across departments and across the globe—is using standardized clusters.

Any cluster's blueprint can be updated at any time. When this occurs Rafay will automatically update the cluster's blueprint and any new addons..

Using GitOps to Manage Cluster Blueprint and Addons

With Rafay's GitOps Service, enterprises can use a GitOps pipeline to create, update addons, and delete a cluster by adding and removing cluster specification files from the GitHub repository.

Rafay's GitOps Service enables continuous delivery through automated deployment, monitoring, and management of continuous deployment pipelines either as a Service or by utilizing the tool of your choice, such as ArgoCD or Flux. With Rafay's GitOps Service, you can:

- Programmatically construct multi-stage GitOps pipelines for both applications and Kubernetes clusters with addons
- Guarantee that the desired state of addons specified in your Git repos is instantly enforced on Kubernetes clusters

Cluster and Addon Drift Detection and Blocking

If a cluster in the wild changes (and creating a snowflake cluster described above) and doesn't conform with the appropriate blueprint, Rafay's Drift Detection feature notifies administrators immediately. Administrators have the option to block or allow changes as per their policy automatically. With this capability, platform teams can ensure that all the clusters in the fleet – even across regions, development, and infrastructures – all use at least one standard cluster blueprint that has been approved for use.

Rafay Kubernetes Addon Catalog

The [Rafay Kubernetes Addon Catalog](#) is a collection of applications that platform teams can deploy to Kubernetes clusters. During the workload template/workload/addon creation, users can choose from dozens of software addons in a Catalog that have been pre-integrated and tested to work with the Rafay KOP. With addons in the Rafay Kubernetes Addon Catalog, integration and testing of the addon with KOP is the responsibility of Rafay. The enterprise has the responsibility of selecting and deploying addons they choose to employ.

One or more Custom Catalogs can also be created, allowing platform teams to create specific catalogs within a project and selectively add applications as required. This gives enterprises flexibility with the number and type of catalogs available for self-service to developer, QA or operations/SRE teams.

Conclusion

Deploying your first Kubernetes cluster is pretty straightforward, but when you want to actually use Kubernetes, addons become critical. The challenge with addons, just like with any software, is that they need to be installed and maintained for consistency over time. This can be complex and error-prone as the number of clusters and addons employed grows, increasing support costs and MTTR (mean time to recovery).

Rafay delivers the required functionality for platform teams to manage clusters and their addons effectively. With Rafay, enterprises can:

- **Setup and manage** standardized cluster configurations & addons in a centralized manner
- **Automate** deployment with reusable cluster blueprints for dev, QA, and production
- **Eliminate** configuration sprawl by enforcing cluster definitions including addons
- **Ensure** clusters always comply with internal policies & industry regulations

Appendix

The following are category definitions for addons used most by enterprises. Many of the descriptions were sourced from the CNCF Cloud Native glossary which is available here for future reference: <https://glossary.cncf.io/>

Core Platform Services

CI/CD Continuous integration (CI) is the first step towards continuous delivery and enables code changes to be merged prior to being deployed.

Continuous delivery, often abbreviated as CD, is a set of practices in which code changes are automatically deployed into an environment.

Secrets Management

Secrets management addons manage digital authentication credentials (secrets), including passwords, keys, APIs, and tokens for use in applications and accounts.

Ingress Ingress controller addons are specialized load balancers for Kubernetes (and other containerized) environments.

Security

Security addons provide a wide range of security capabilities related to the detection and prevention of attacks attributed to misconfigurations, malware, vulnerabilities, etc.

Service Mesh

A service mesh addons defines how different parts of an application share data and communicate with one another.

Networking

Networking addons simplify the service-to-service network operations and communication such as traffic management, authorization, and encryption.

Machine Learning

Machine learning (ML) addons are tools that programmatically author, schedule, and monitor ML workflows.

Observability

Observability is the capability to continuously generate and discover actionable insights based on signals from the apps or clusters managed.

Policy Management

Policy management addons provide ways to create, manage and enforce policies for how Kubernetes clusters should operate.

Analytics/ Logging

Analytics & logging addons collect and optionally analyze data used by Kubernetes clusters and applications running on top of them.

Cost Management

Cost management addons help enterprises gain real-time visibility into the cost of running Kubernetes clusters, primarily in public clouds.

See for yourself how to deploy Kubernetes faster, reduce security & operational risk, and control the total cost of Kubernetes operations by trying the cloud-based Rafay Kubernetes Operations Platform.

Start a free trial today!

Learn More About Rafay Systems

