

CNCF SANDBOX PROJECT

# K8up Under The Hood

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Kubernetes Backup Operator

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# Why Backups Matter

Even the big cloud providers lose data. Your cluster is not special.



## OVHcloud Strasbourg, March 2021

SBG2 data center destroyed by fire.  
3.6 million websites went offline.  
Customer data permanently lost.

## Google Cloud europe-west9

April 2023

**Water leak → Fire → Power down**

Spanner replicas not evenly spread  
across AZs. One building down  
→ lost quorum → IAM cascade  
→ region-wide outage

## Google Cloud europe-west9, April 2023

Water pipe leak caused fire in Paris DC.  
Workloads not spread across AZs →  
entire region offline.

# Manifests belong in Git. K8up takes care of your data.



## Data-first

Focused on PVCs – your data.  
YAML manifests belong in Git,  
not in your backup.



## Restic-powered

27k+ GitHub stars, 10+ yrs in prod.  
Encrypted & deduplicated.  
S3 / Azure / GCS / SFTP backends.



## Kubernetes-native

Everything via CRDs: Schedule,  
Backup, Restore, Prune, Check.  
Operator pattern.



## Self-Service

Devs manage their own backups.  
Multi-tenant ready.  
15 lines of YAML, done.

# One YAML to Rule Them All



Backup, Prune, Check – one Schedule CR, three cron lines.

```
apiVersion: k8up.io/v1
kind: Schedule
metadata:
  name: my-app-backup
spec:
  backup:
    schedule: "0 3 * * *"
  prune:
    schedule: "0 5 * * 0"
    retention:
      keepDaily: 14
  check:
    schedule: "0 6 1 * *"
  backend:
    repoPasswordSecretRef:
      name: backup-repo
      key: password
    s3:
      endpoint: s3.example.com
      bucket: backups
      accessKeyIDSecretRef:
        name: backup-s3-creds
        key: access-key-id
```



Backs up all PVCs  
in the namespace



Nightly backup,  
weekly prune, monthly check



Restic encrypts everything.  
Repo password from Secret.



S3 credentials from  
Kubernetes Secrets



Any S3-compatible  
storage backend

# Under The Hood: Stateful Apps



k8up

Consistent backups of PostgreSQL, MySQL, MongoDB & more.

**Problem:** File-level backup of a running DB = inconsistent data → **Solution:** K8up runs pg\_dump before Restic snapshots

## Option 1: Annotation

```
annotations:
  k8up.io/backupcommand: >-
    sh -c 'pg_dump --clean'
  k8up.io/file-extension: .sql
```

Add to your Pod spec – K8up captures stdout and backs it up via Restic.

## Option 2: PreBackupPod

```
kind: PreBackupPod
spec:
  backupCommand: >-
    pg_dump -h $PGHOST -U $PGUSER mydb
  fileExtension: .sql
  pod:
    spec:
      containers:
        - image: postgres:16
```

Spins up a dedicated pod – for managed DBs (RDS, CloudSQL) or external services.

# List Snapshots & Restore

See what's available, restore with one YAML.

## List available backups

```
$ kubectl get snapshots
```

| NAME    | DATE                | ID       |
|---------|---------------------|----------|
| snap-01 | 2026-03-22T03:00:00 | a1b2c3d4 |
| snap-02 | 2026-03-21T03:00:00 | e5f6g7h8 |

K8up syncs Restic snapshots into  
Kubernetes CRs – visible via kubectl.

## Restore

```
apiVersion: k8up.io/v1
kind: Restore
metadata:
  name: restore-app-data
spec:
  snapshot: a1b2c3d4
  restoreMethod:
    folder:
      claimName: my-app-pvc
  backend:
    repoPasswordSecretRef:
      name: backup-repo
      key: password
  s3:
    endpoint: s3.example.com
    bucket: backups
```

Point-in-time restore from any snapshot  
directly into an existing PVC.

# Battle-Tested Since 2019



**2019**

**2021**

**2024**

**2025**

**2026**



First release  
KubeCon Barcelona

CNCF Sandbox  
accepted

v2.13 + v2.14  
cosign, restore filters

Restic 0.18  
ephemeral dirs

Stable, mature  
Production-proven

**7+**

Years in  
Production

**100s**

Namespaces  
protected

**24/7**

Automated  
Backups

**∞**

S3-compatible  
Backends

# Join the K8up Community



K8up is open source and thrives on contributors like you.

## Try it now

```
helm repo add k8up-io
```

```
https://k8up-io.github.io/  
k8up
```

```
helm install k8up  
k8up-io/k8up
```

## Contribute

Code, Docs, Bug Reports  
[github.com/k8up-io/k8up](https://github.com/k8up-io/k8up)

## Join & Connect

CNCF Slack: #k8up  
Monthly community meetings

**[k8up.io](https://k8up.io) · [github.com/k8up-io/k8up](https://github.com/k8up-io/k8up)**

# Visit the K8up Project Booth!

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K8up maintainers at the booth:

Tobias, Nicolas & Liene

Also maintaining K8up:

Sebi, Simon & Gabriel

