EDB POSTGRES AI

TECHNICAL BRIEF

EDB Postgres® AI for CloudNativePG™

CloudNativePG (CNPG), originally built by EDB and now a CNCF Sandbox project, represents a paradigm shift in how PostgreSQL is managed within Kubernetes environments. Unlike traditional approaches that treat containers as mere virtual machines, CNPG is an open-source operator designed specifically for the Kubernetes API, treating the database as a critical capability of the cloud-native ecosystem. By automating the full lifecycle—from high availability failover and point-in-time recovery to native Prometheus-based observability—CNPG eliminates the operational friction typically associated with running stateful workloads at scale.

CNPG operates on the principle that while a database is essentially an application, it is a special one where data serves as the organization's most critical asset. By incorporating Level 5 autonomous capabilities such as automated failover and self-healing, CNPG manages the entire database lifecycle through a fully declarative approach, ensuring that PostgreSQL functions as a native participant within the Kubernetes ecosystem.

The CNPG Evolution: Decoupled, Distributed, and Declarative

While CNPG is fundamentally storage agnostic, the architecture favors a shared-nothing deployment to maximize resilience. By distributing instances across different worker nodes and Availability Zones CNPG ensures that high availability is managed at the application level. Instead of relying on storage-level replication, data reliability is maintained through native physical streaming replication, supporting both asynchronous and synchronous modes for precise control over consistency and performance. This philosophy is anchored in immutability, relying on application containers where the Instance Manager (PID 1) supervises a single, unmodifiable PostgreSQL process. This approach eliminates environmental variability and enhances security by ensuring the runtime remains consistent and predictable across the entire lifecycle.

CNPG has introduced a revolutionary, declarative approach to managing complex extensions like pgvector and PostGIS without the need for monolithic custom images. By leveraging the Kubernetes ImageVolume feature and the extension_control_path parameter—a feature introduced by EDB engineers into the PostgreSQL 18 core—the operator can mount extensions from separate, dedicated container images directly into the Postgres pod at runtime. This architecture enables decoupled upgrades, allowing platform teams to update the core PostgreSQL engine independently of extension binaries. This significantly simplifies maintenance, narrows the security attack surface, and streamlines patching. Furthermore, this method allows for dynamic evaluation where extensions can be added to existing clusters via the Kubernetes API, eliminating the traditional burden of building and maintaining heavy, custom-built Docker images.

CNPG achieves global business continuity through distributed topologies spanning multiple Kubernetes clusters. Leveraging replica clusters enables cross-region recovery via streaming replication and/or object store WAL shipping. This architecture provides the flexibility to deploy PostgreSQL across on-premises bare metal and major cloud providers with ease.

Why EDB Postgres AI (EDB PG AI) for CloudNativePG

For enterprises requiring higher security and legacy modernization, the EDB Postgres AI variant extends these capabilities by offering a choice of professional operands, including EDB Postgres Extended (PGE) for Transparent Data Encryption (TDE), and EDB Postgres Advanced Server (EDB PG AI) for workloads requiring an integrated Oracle Compatibility Layer. Our solution ensures a hardened software supply chain across Red Hat OpenShift environments by leveraging FIPS 140-3–ready Red Hat Universal Base Images (UBI) to provide full certification for both the operator and its operands. Furthermore, EDB PG AI extends infrastructure portability to IBM Power and IBM Z (zLinux) systems. Selected versions of EDB Postgres AI for CloudNativePG come with a Long-Term Support (LTS) policy that provides extended stability for mission-critical environments.

To help you choose the right version for your organization, here is a comparison between the standard open-source CloudNativePG and its enterprise-grade counterpart, EDB Postgres AI for CloudNativePG.

Comparison: CloudNativePG vs. EDB Postgres AI

Feature	CloudNativePG (Open Source)	EDB Postgres AI (Enterprise)
Core License	Apache License 2.0	EDB Subscription Required
High Availability	Level 5 Auto-Pilot	Level 5 Auto-Pilot
Postgres Versions	Standard PostgresSQL	Postgres + Oracle Compatibility
Security	TLS, cert-manager integration	Adds TDE (Transparent Data Encryption)
Support	Community-driven	24/7 Professional EDB Support
Stability	Standard release cycle	Annual Long Term Support (LTS)
Platforms	Any k8s distribution	Adds IBM Power & OpenShift Support
Backup Tools	S3-compatible, Barman Cloud	Adds Kasten, Velero/OADP Integration

To learn more:

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EDB Postgres AI is the first open, enterprise-grade sovereign data and AI platform, with a secure, compliant, and fully scalable environment, on premises and across clouds. Supported by a global partner network, EDB Postgres AI unifies transactional, analytical, and AI workloads, enabling organizations to operationalize their data and LLMs where, when, and how they need them. For more information, visit enterprisedb.com

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