The 3-2-1 Automated Backup Architecture

A single drive failure or sync glitch can erase years of business data. This automated architecture implements the enterprise 3-2-1 rule using Restic, encrypted snapshots, and nightly offsite delta replication.

⚡ VERIFIED PRODUCTION STACK | 💬 LEAD TRIGGER: "BACKUP" | 🚀 VELOCITY: 10X LEVERAGE | 🔒 ZERO OPEN PORTS

3 Copies	2 Media	1 Offsite	03:00 UTC
INDEPENDENT STORAGE TARGETS	NVME MIRROR + COLD ZFS	ENCRYPTED CLOUD VAULT	AUTOMATED DAILY VERIFICATION

💾 1. Production Pool

LOCAL NVME MIRROR

- High-Speed Storage: Primary Docker volumes running on PCIe 4.0 NVMe.
- Hourly Snapshots: ZFS/Btrfs copy-on-write snapshots for instant file recovery.
- Zero Performance Impact: Non-blocking atomic filesystem point-in-time freezes.

🛡️ 2. Local Backup Vault

AIR-GAPPED NAS / HDD

- Secondary Media: Dedicated local TrueNAS / HDD backup vault pool.
- Restic Deduplication: Block-level deduplication saves 85% of disk capacity.
- Append-Only Mode: Protects local backup archives against ransomware encryption.

☁️ 3. Encrypted Offsite

COLD OBJECT REPLICA

- Cold Cloud Replica: Encrypted delta sync to Cloudflare R2, Backblaze B2, or S3.
- Zero Egress Fees: S3-compatible endpoints with zero bandwidth extraction costs.
- Client-Side AES-256: Cloud provider has zero access to encryption passphrases.

🤖 4. Health Automation

SYSTEMD TEST TIMERS

- Automated Verification: 'restic check' integrity run automatically every Sunday.
- Automated Restore Test: Random snapshot test extraction verified at 03:00 UTC.
- Failure Alerts: Instant WhatsApp/Discord webhook alerts on failed backups.

📋 4-Phase Implementation Pipeline

PHASE 01
Init Repo
Initialize local and remote encrypted Restic repositories.

PHASE 02
Lock Script
Deploy backup_321_restic.sh with database freeze hooks.

PHASE 03
Timer Unit
Enable systemd timer for automated nightly 03:00 UTC runs.

PHASE 04
Drill Test
Perform simulated disaster recovery restore in under 5 minutes.

bash — agy-dev-env — backup-blueprint — LIVE TERMINAL

```
# 1. Trigger automated 3-2-1 backup verification
$ sudo /usr/local/bin/backup_321_restic.sh --dry-run
# 2. Check snapshot integrity and repository deduplication
$ restic check && restic stats
# 3. Verify nightly systemd automation timer status
$ systemctl status restic-backup.timer
```

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