Exploring Free Cloud Hosting Options for Node.js/Express + PostgreSQL Web APIs

**1. Overview**

This document explores cloud hosting options for deploying a Node.js/Express Web API that uses a PostgreSQL database.  
Two primary free (or student-credit-supported) hosting platforms are evaluated:

1. Render
2. Koyeb

Each option is analyzed for its setup process, database integration, pricing, advantages, and disadvantages.  
Both services were tested using the HelloWorld API provided for demonstration.

**2. Option 1 — Render**

**Website:** [**https://render.com**](https://render.com)

**Description**

Render provides a modern Platform-as-a-Service (PaaS) environment that allows developers to deploy Node.js and Express applications directly from a GitHub repository.  
It automatically builds, runs, and hosts web services and offers fully managed PostgreSQL databases that integrate seamlessly with deployed APIs.

**Key Features**

* One-click GitHub deployment for Node.js and Express apps
* Free web service instances with limited monthly runtime
* Free managed PostgreSQL database (with size and connection limits)
* Automatic HTTPS, continuous redeployment on Git pushes
* Built-in environment variable management for securely storing credentials

**Setup Summary**

1. Create a Render account and log in.
2. On the dashboard, select Create New Service → New Web Service.
3. Connect Render to your GitHub account and select your repository.
4. Configure the deployment:
   * Build Command: npm install
   * Start Command: npm run dev
   * Instance Type: Free Tier (for demo purposes)
   * Environment Variables: Add manually or import from .env file
5. Click Deploy Web Service.
6. Once deployed, create a PostgreSQL database:
   * Go back to the dashboard → Create New Service → PostgreSQL
   * Set the database name, user, and select the Free Tier instance
   * After creation, copy the Internal Database URL
7. Return to the Web Service → Environment → Add Variable:
   * Key: DATABASE\_URL
   * Value: *(the Internal Database URL copied from the database service)*
8. Save changes and redeploy the web service.

**Free Tier Details**

* 750 free hours/month (enough for one always-on small instance)
* 1 free PostgreSQL database up to 256 MB of storage

**Pros**

**✅** Automatic build and deploy from GitHub  
✅ Integrated managed PostgreSQL database  
✅ Custom domain & free HTTPS certificates  
✅ Ideal for both frontend and backend hosting

**Cons**

**❌** Free services may “spin down” when idle (cold-start delay)  
❌ Limited PostgreSQL storage (256 MB)  
❌ Limited CPU and memory for heavy workloads

**3. Option 2 — Koyeb**

**Website: https://www.koyeb.com**

**Description**

Koyeb is a developer-friendly cloud platform for running web services and APIs. It supports Node.js applications and offers built-in integration with GitHub for automatic deployments.  
Koyeb also provides an easy way to attach a managed PostgreSQL database to your API.

**Key Features**

* Simple GitHub integration for continuous deployment
* Free micro-instance tier suitable for testing APIs
* Built-in HTTPS, metrics, and logs
* Environment variables for secure configuration
* Managed PostgreSQL database service

**Setup Summary**

1. Create a Koyeb account and connect it to your GitHub account.
2. Click Create New Service.
3. On the “Create a new service” page, select Install GitHub App and choose the repository to deploy.
4. Choose the Buildpack deployment option (Koyeb auto-detects Node.js).
5. Select the hardware configuration — use the Free Micro Instance for this demo.
6. Add environment variables and specify build/run commands:
   * Build Command: npm install
   * Run Command: npm run dev
7. Create a PostgreSQL database service:
   * From the homepage, select Create New Service → Database
   * Configure a new database instance and copy the Connection Details
8. Go back to your web service → Settings → Environment Variables:
   * Add variable DATABASE\_URL with the connection string copied from the database.
9. Click Deploy to finalize configuration.

**Free Tier Details**

* Free micro-instance suitable for lightweight APIs
* Free managed PostgreSQL database (limited to development use)

**Pros**

**✅** Automatic deployment from GitHub  
✅ Integrated managed PostgreSQL service  
✅ Built-in HTTPS and logs  
✅ User-friendly dashboard and free tier for small apps

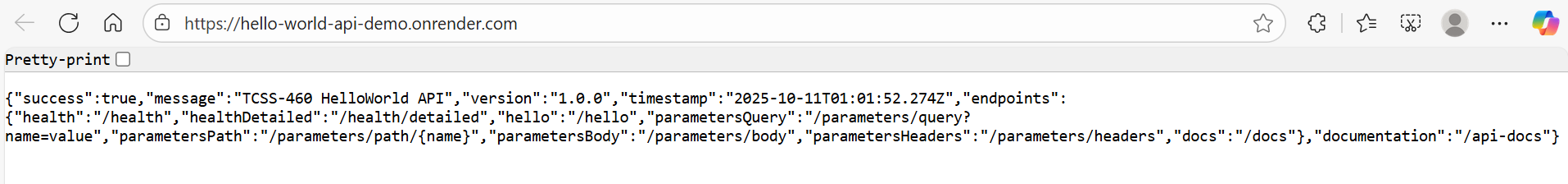
**Cons**

**❌** Free micro-instance may go idle after inactivity  
❌ Limited database size and connections  
❌ Fewer community tutorials compared to Render

**Demo for Render:** [**hello-world-api-demo.onrender.com**](https://hello-world-api-demo.onrender.com/)

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**Demo for Koyeb:** [**structural-ardella-tcss460-team7-00146b02.koyeb.app**](https://structural-ardella-tcss460-team7-00146b02.koyeb.app/)

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