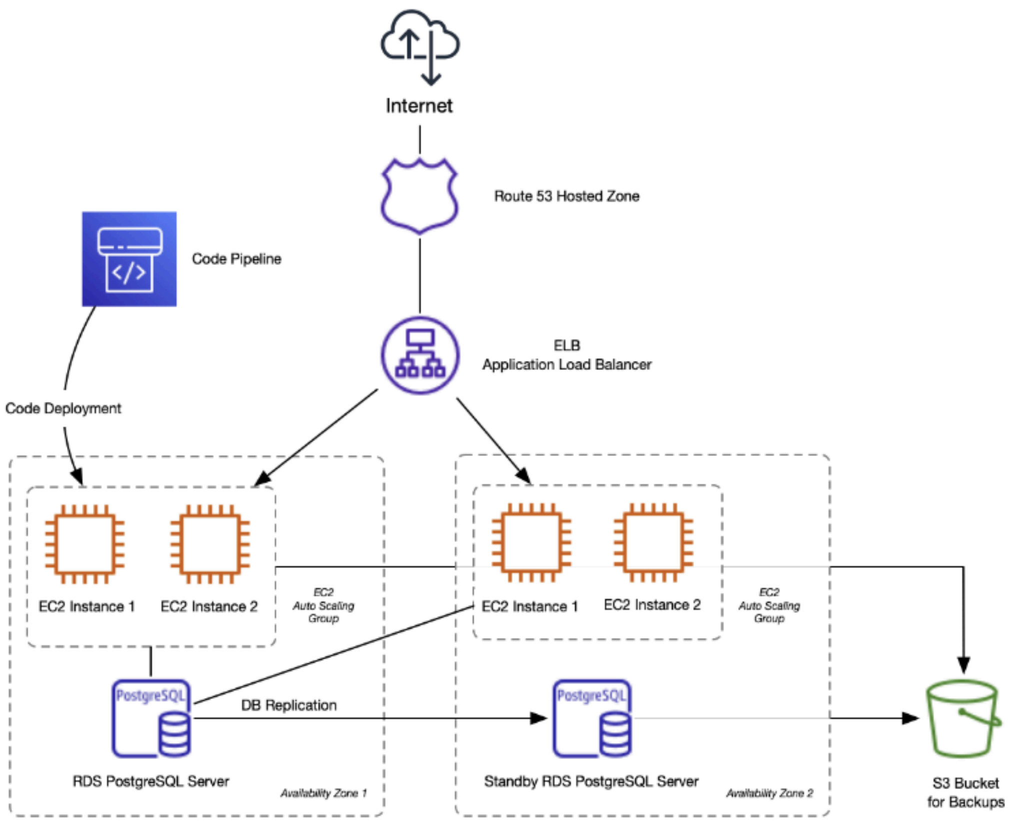
Architecture overview

We'll break this into layers: frontend, backend, database, deployment strategy, and monitoring.

Solution diagram



🔹 Route 53 (DNS Service)

- Manages your domain name and routes traffic to the correct AWS resources.
- Chosen for its deep integration with other AWS services and ability to handle health checks and routing policies.

🔹 **Elastic Load Balancer (ELB)**

- Automatically distributes incoming application traffic across multiple EC2 instances.
- Helps ensure high availability and smooth scaling, and protects against a single point of failure.

🔹 **AWS Elastic Beanstalk (with Auto Scaling)**

- Manages deployment, scaling, and health monitoring for your Flask application.
- Supports **blue/green deployments**, which reduce downtime during releases — a key concern for your team.
- Automatically scales EC2 instances based on traffic, so you can handle peak loads without overpaying during quieter periods.

🔹 **Amazon RDS (PostgreSQL)**

- Fully managed PostgreSQL database, replacing your local instance.
- Supports multi-AZ deployment for high availability and built-in backups for disaster recovery.
- Reduces operational overhead and improves performance consistency.

🔹 **Amazon S3**

- Hosts your static content (e.g., images, JavaScript, CSS, or even your entire React SPA).
- Inexpensive, durable, and integrates easily with CloudFront (if needed for global content delivery).

🔹 **AWS CodePipeline**

- Automates your deployment pipeline from Git to production.
- Ensures you can roll out changes frequently, safely, and with zero downtime when combined with Elastic Beanstalk’s deployment options.

💰 Cost Considerations

We understand cost control is important, especially as a startup. While we won't dive into exact figures, here's a breakdown of how costs may behave month-to-month:

- **Elastic Beanstalk (EC2 Auto Scaling Group):**
  - Costs are driven by the number and type of EC2 instances.
  - You can scale down to a single instance during off-hours and scale up during peak loads, which keeps costs efficient.
  - As your traffic grows, the autoscaling group ensures you're only paying for the compute you need.
- **RDS:**
  - You'll pay based on the instance type, storage, and backup retention.
  - Like EC2, RDS can be sized up/down as needed and supports Reserved Instances for significant discounts once usage is stable.
- **S3:**
  - Very cost-effective for static asset hosting.
  - You're billed by storage used and the number of requests — both tend to remain low-cost unless you serve high-volume media.
- **Route 53 & ELB:**
  - Route 53 charges a small monthly fee per hosted zone plus traffic-based costs for DNS queries.
  - Load balancer costs are based on hours active and amount of data processed.
- **CodePipeline:**
  - Has a modest monthly cost per pipeline, which remains predictable and low even with frequent deployments.

If you continue growing at a linear pace, your AWS costs will scale accordingly. Importantly, this setup gives you the flexibility to optimize at any stage — for example, shifting to Reserved Instances or Spot Instances for EC2 when ready.

✅ In Summary

This architecture will address the performance and reliability issues you’re currently facing, support your projected growth, and eliminate downtime during deployments. It also establishes a strong foundation for disaster recovery and long-term scalability — all while keeping monthly costs tied closely to actual usage.

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