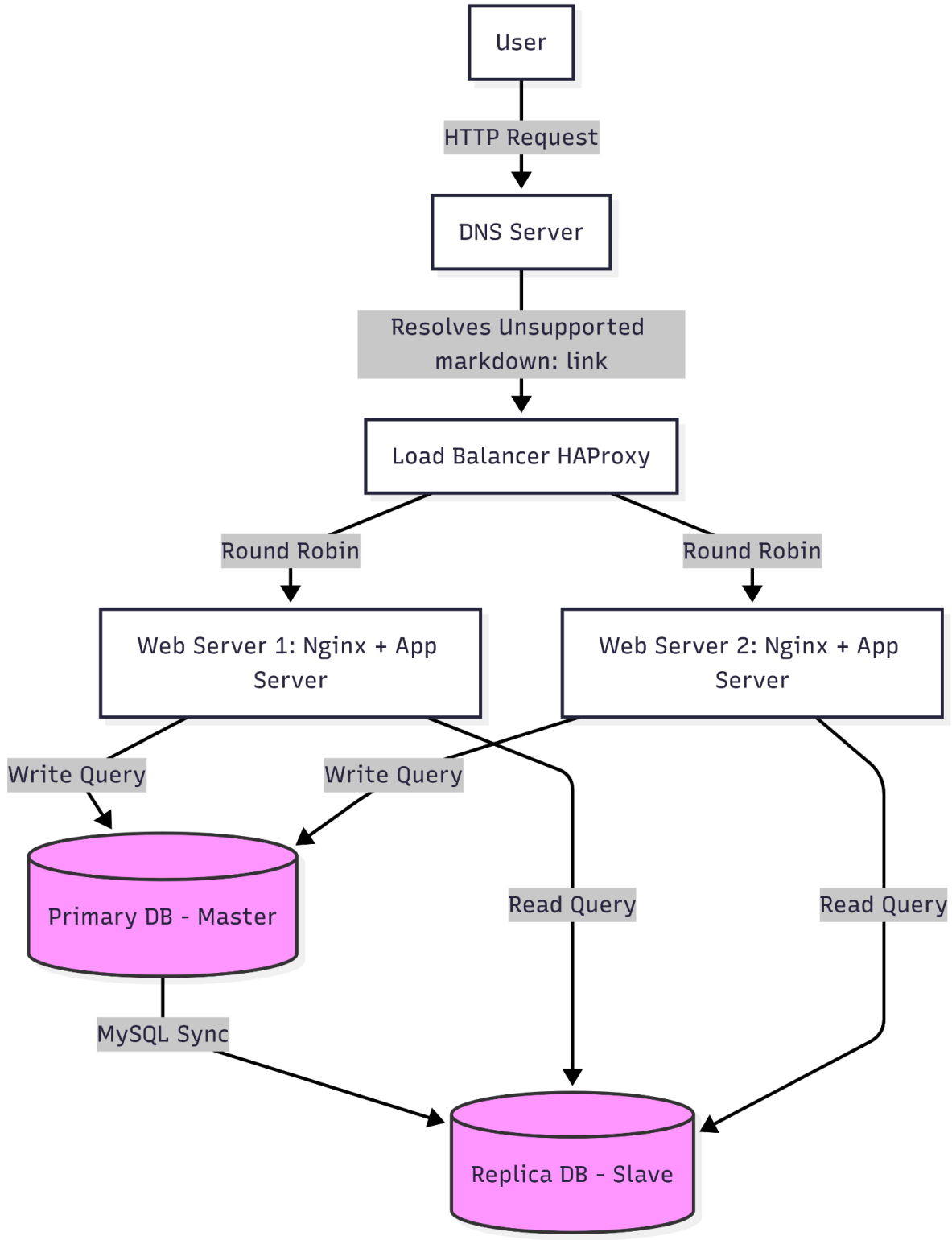
Diagram (ASCII Representation)



Component Explanations

1. Added Components

- Load Balancer (HAProxy):
  Distributes traffic across 2 web servers to:
  - Avoid overloading a single server.
  - Improve availability (if one server fails, the other handles requests).
- Second Web Server:
  Provides redundancy and scalability. Doubles capacity to handle traffic.
- Primary-Replica Database:
  - Primary (Master): Handles all write operations.
  - Replica (Slave): Read-only copy for queries, reducing primary's load.

2. Load Balancer Distribution Algorithm

- Round Robin:
  Rotates requests evenly between servers (e.g., Request 1 → Server 1, Request 2 → Server 2).
  - Simple and stateless, but doesn't account for server load.

3. Active-Active vs. Active-Passive

- Active-Active:
  Both servers handle traffic (used here). Maximizes resource use but requires session sync.
- Active-Passive:
  Backup server stays idle until the primary fails. Lower resource use but higher failover time.

4. Primary-Replica Database Cluster

- Primary (Master):
  - Handles all writes (INSERT/UPDATE/DELETE).
  - Replicates changes to the Replica asynchronously.
- Replica (Slave):
  - Serves read-only queries (SELECT).
  - Can replace Primary if it fails (with manual promotion).

5. Application's Perspective

- Primary: Used for write operations (e.g., user signup).
- Replica: Used for read-heavy tasks (e.g., displaying posts).

Limitations

1. Remaining SPOFs:
    - Load Balancer: If HAProxy fails, traffic stops.
    - Primary Database: No automatic failover; replica promotion isn’t instant.
2. Security Issues:
    - No firewall or HTTPS (data transmitted in plaintext).
    - No encryption for database replication.
3. No Monitoring:
    - Can’t detect failures or performance bottlenecks proactively.