Intro to Backend Development

Lecture 6 · Deployment

Shungo Najima
Jessica Sylvester

Announcements

- Attendance grades published on CMS
- PA5 due Wednesday by 11:59 PM

Review

Containerization

- Package code into a standardized unit of software
- Build code into images
- Run images in containers
- Push images to Docker Hub

Servers

Servers

- A software or hardware device
- Accepts and responds to requests made by client
- Requests are made over a network

Examples of Servers

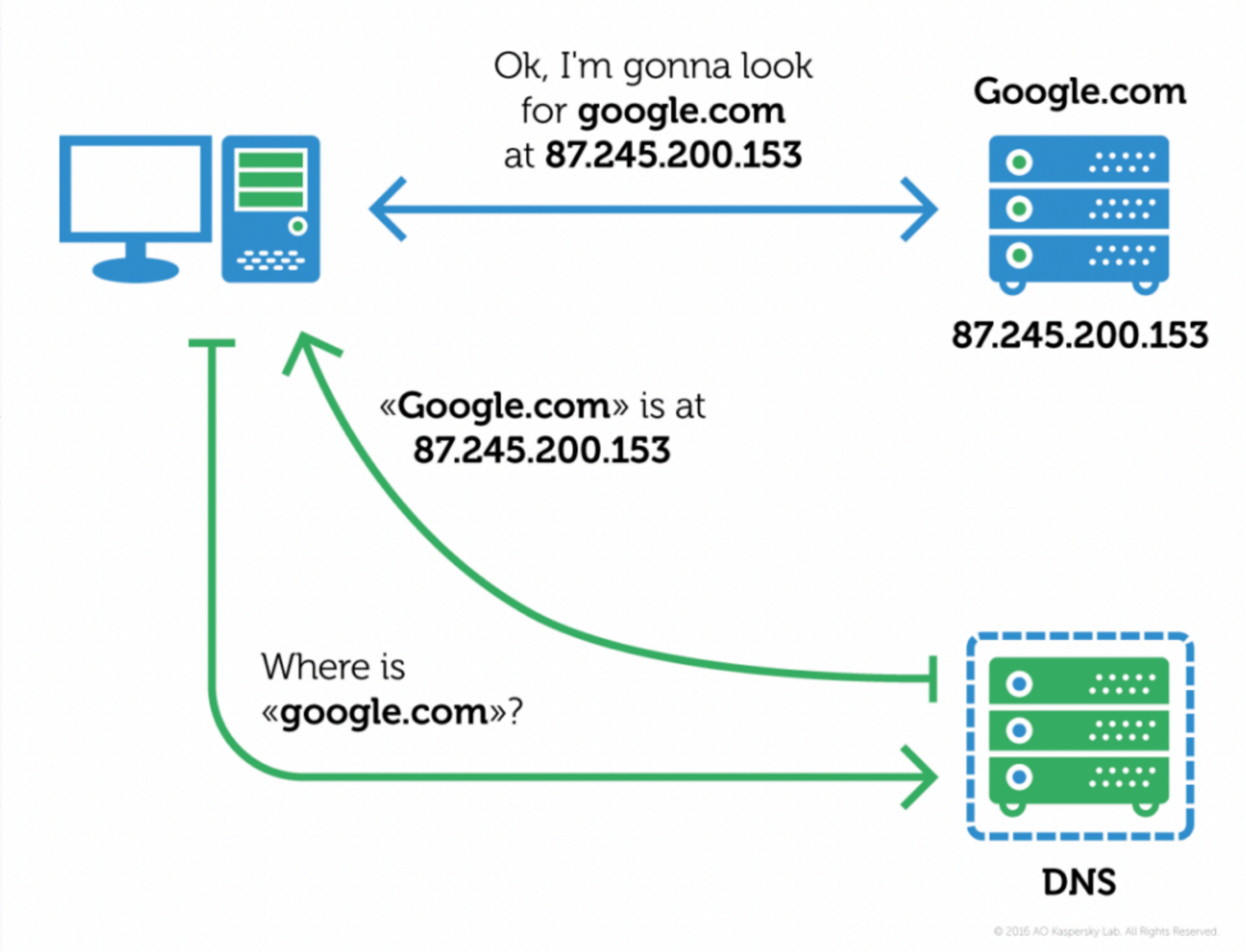
- Web server: show pages and run apps through web browsers
- Email server: manage sending and receiving emails
  - clients are Desktop apps or web browsers
- Identity server: manage login and security roles
  - ex. logging into student center but making a stop at CUWebLogin

Servers and the Network

- An internet server is assigned an IP address
- The IP address distinguishes a server from others on the network when it connects to a router
    - Example: 127.0.0.1

Servers and the Network

- Users connect to a server by its domain name
  - Example: www.google.com
- Domain names are translated to IP addresses by a DNS resolver


Ok, I'm gonna look
for google.com
at 87.245.200.153
Google.com
87.245.200.153
«Google.com» is at
87.245.200.153
Where is
«google.com»?
DNS
© 2016 AO Kaspersky Lab. All Rights Reserved.

Deployment

What Our App Needs

- Always be running
- Open to receiving requests
- Be publicly accessible on the web
- Hardware that is managed for us and connected to the cloud

Renting a Server

- Want to run our application on a server in the cloud
- Will run our containerized software just like we do locally
- Allow the server to be managed by a cloud service
  - Handle physical maintenance
  - Provide tools to automate security, scaling, and crashes


amazon
web services


DigitalOcean


Google Cloud


Microsoft
Azure

Accessing the Server

- Secure Shell (SSH) network protocol
- Gives users a secure way to access a computer
  - Open and view resources
  - Execute commands
  - Install packages and update software

```
~/.s/eatery ❯❯❯ ssh -i server.pem appdev@eatery-backend.cornellappdev.com

Welcome to Ubuntu 16.04.5 LTS (GNU/Linux 4.4.0-138-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  Get cloud support with Ubuntu Advantage Cloud Guest:
    http://www.ubuntu.com/business/services/cloud

135 packages can be updated.
0 updates are security updates.

New release '18.04.3 LTS' available.
Run 'do-release-upgrade' to upgrade to it.


*** System restart required ***
Last login: Mon Nov  4 19:21:00 2019 from 128.84.125.217
appdev@eatery:~$
```

Security

- Provide username and password credentials
- Public/private key authentication
  - Encrypted string that is more secure than long passwords

SSH In Action

- `ssh user@server.com`
- Prompted with server's key and request to connect
  - If not connected before, add to `known_hosts`
- Authenticated via public/private keys or credentials
- If successful, will open command prompt

Integrating Docker with Google Cloud

Google Cloud

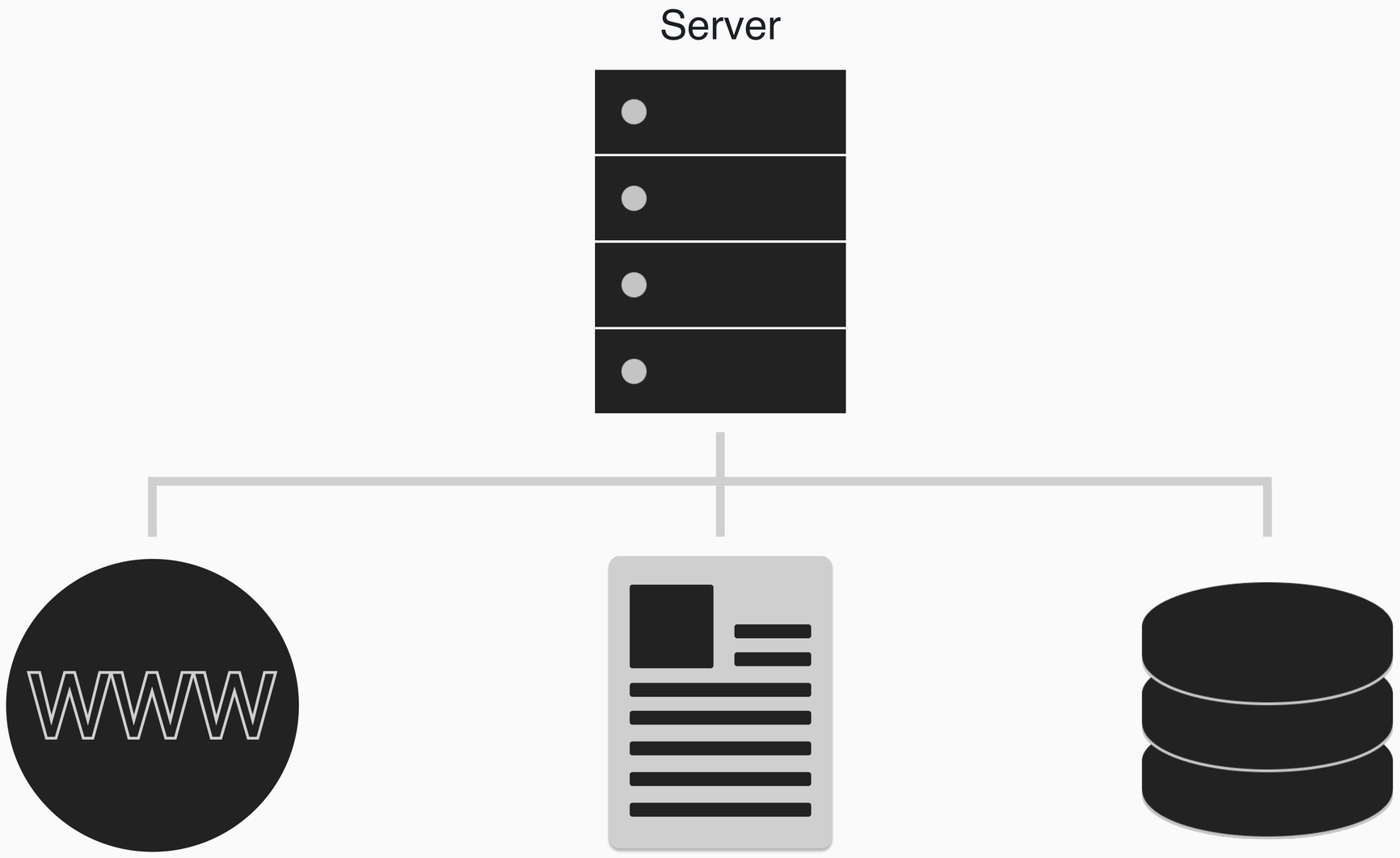
- A cloud service
  - Allows you to deploy Docker images easily
  - Can build, push, and release images to web

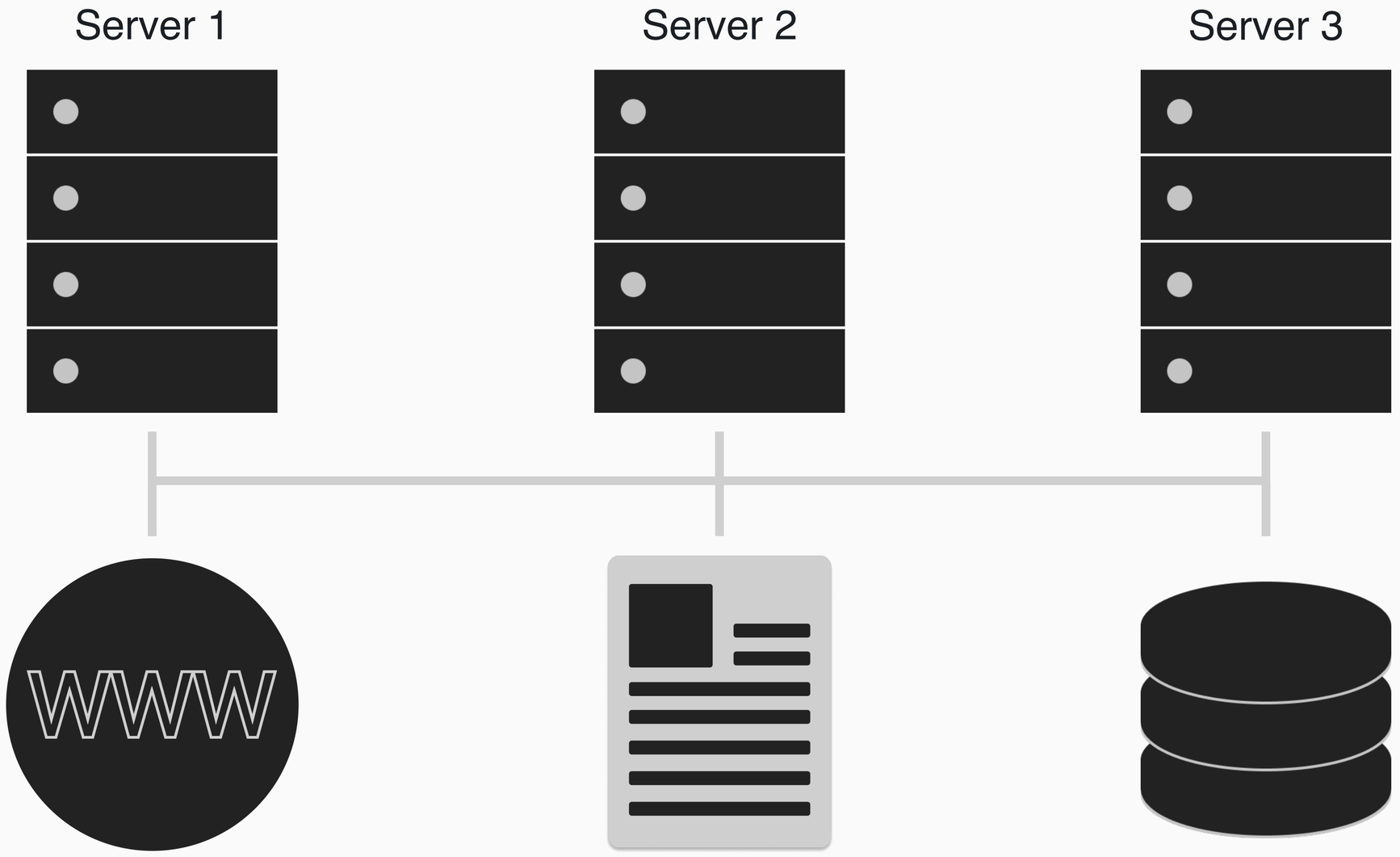
How do we optimize?

Clustering

Overview

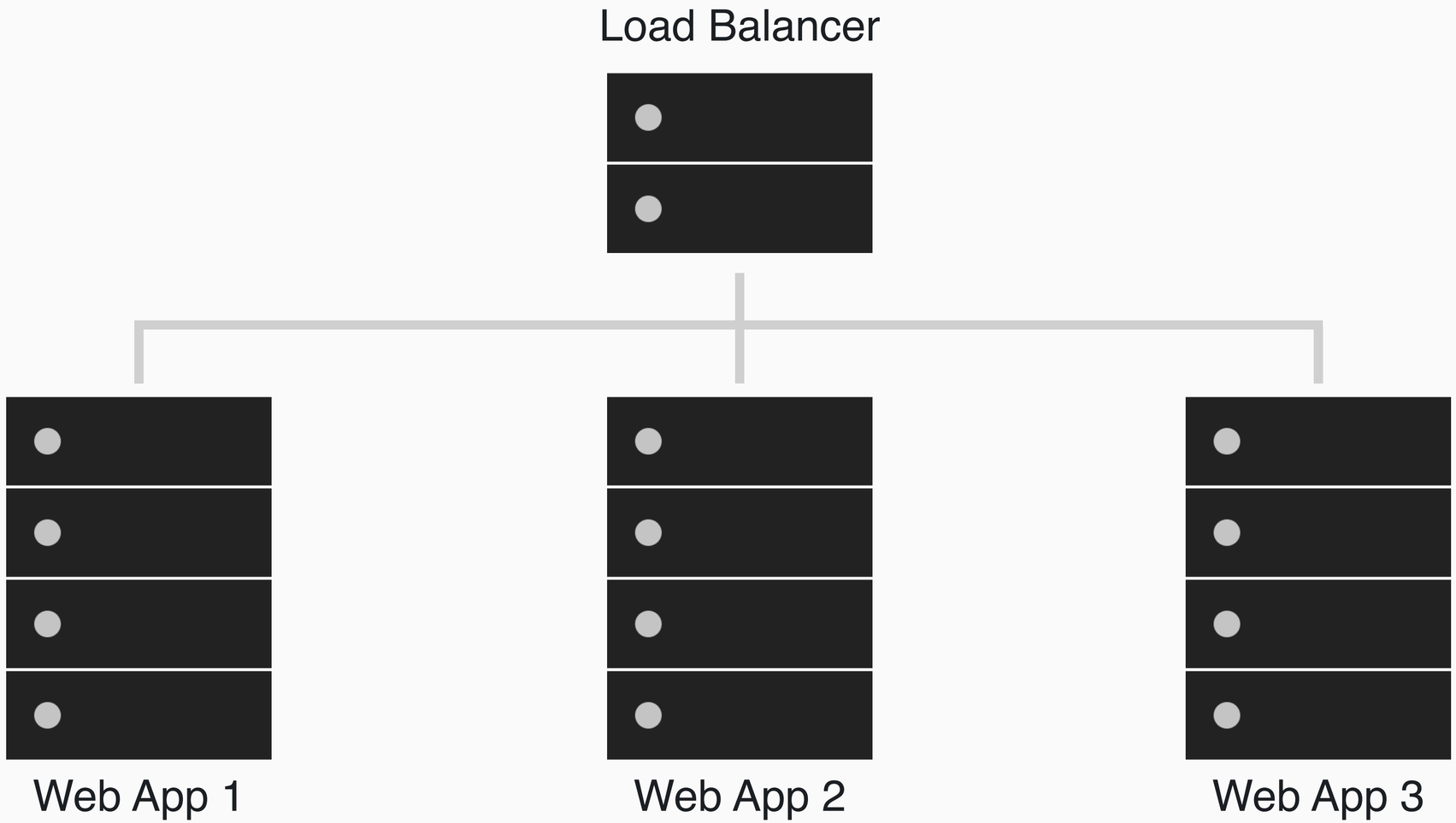
- Group of servers connected to behave as one system
- Each server is optimized for a particular purpose
- Better performing system

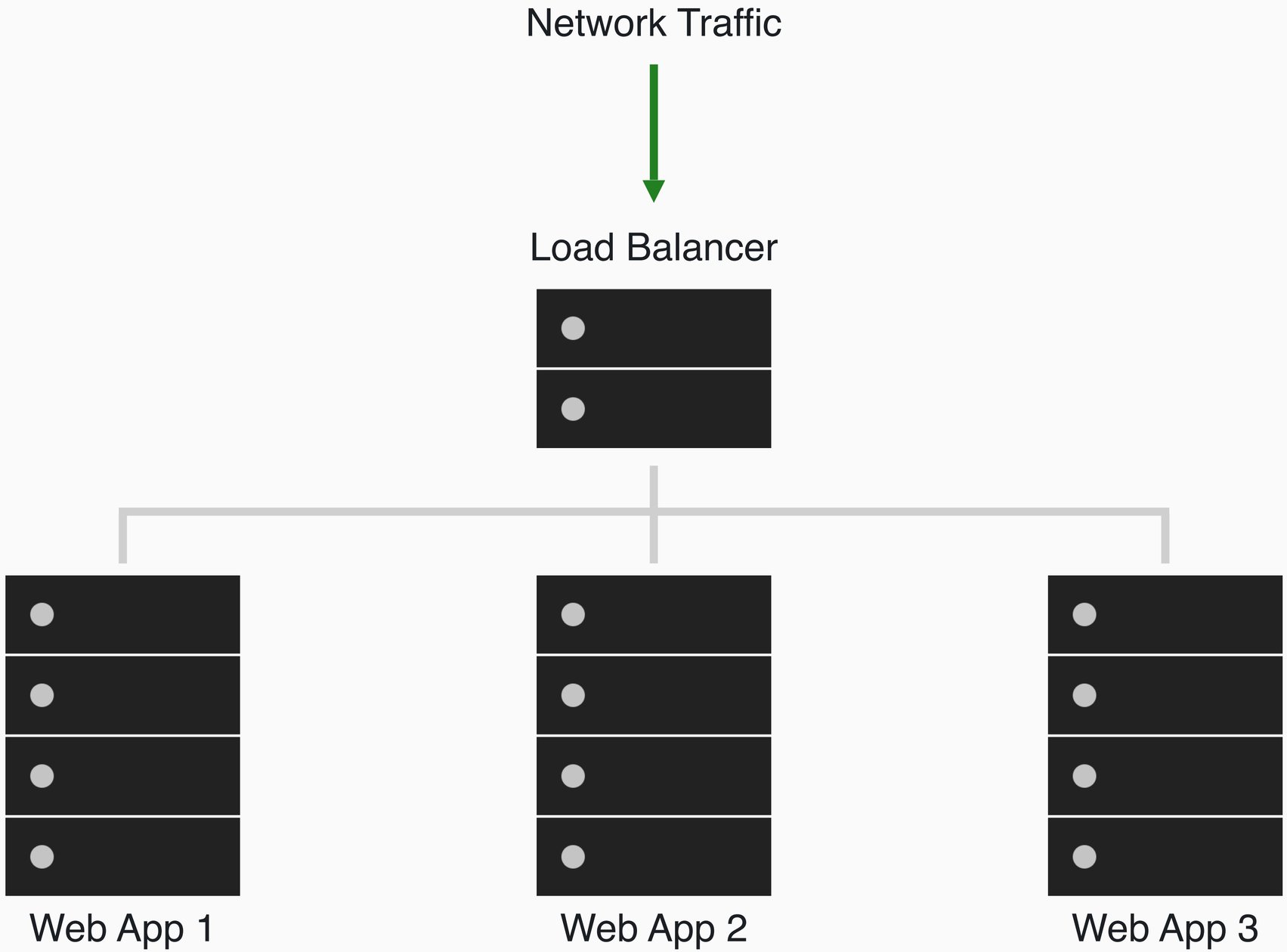

Server
WWW
Web Application
File Storage
Database

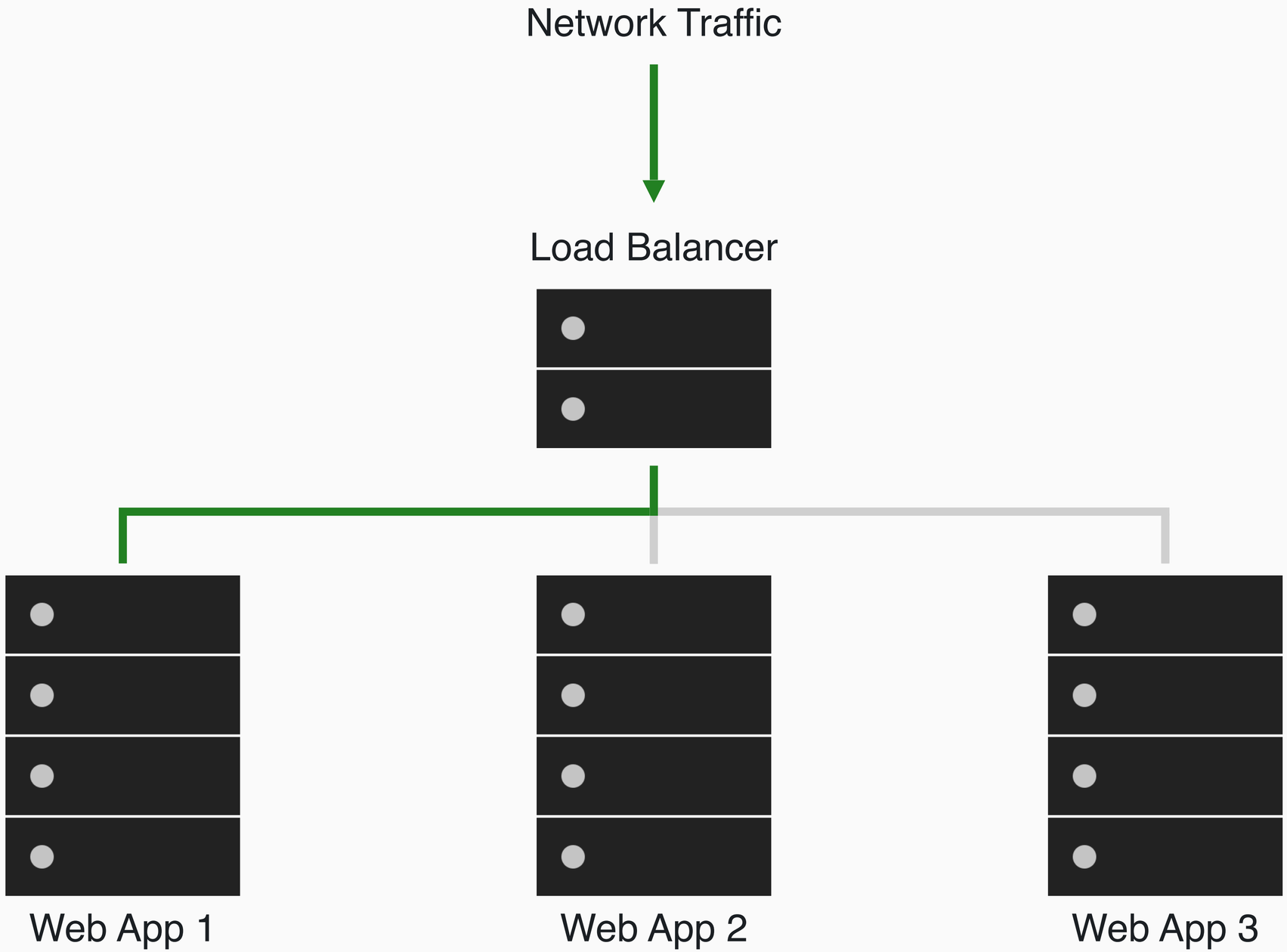

Server 1
Server 2
Server 3
WWW
Web Application
File Storage
Database

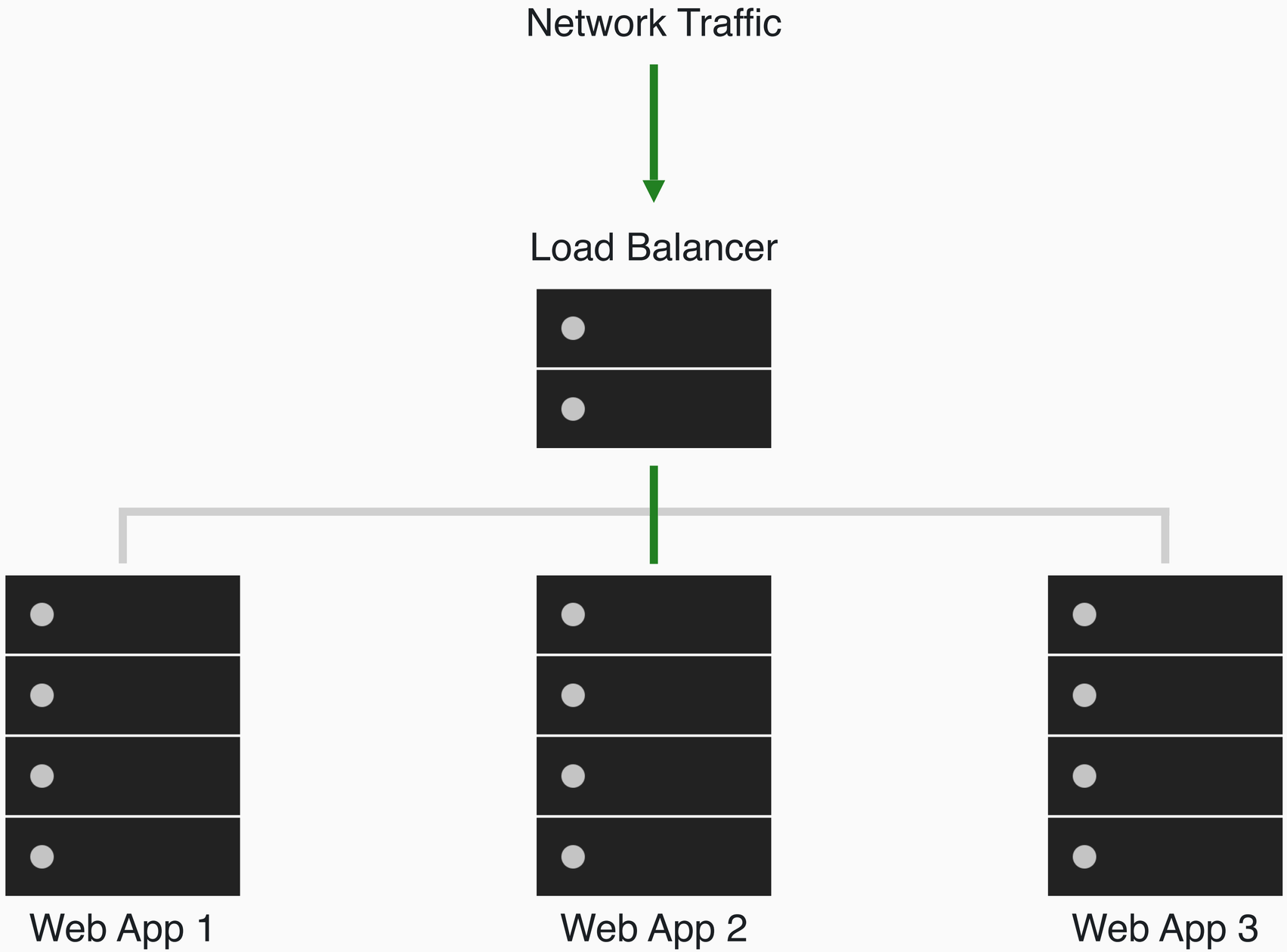
Benefits

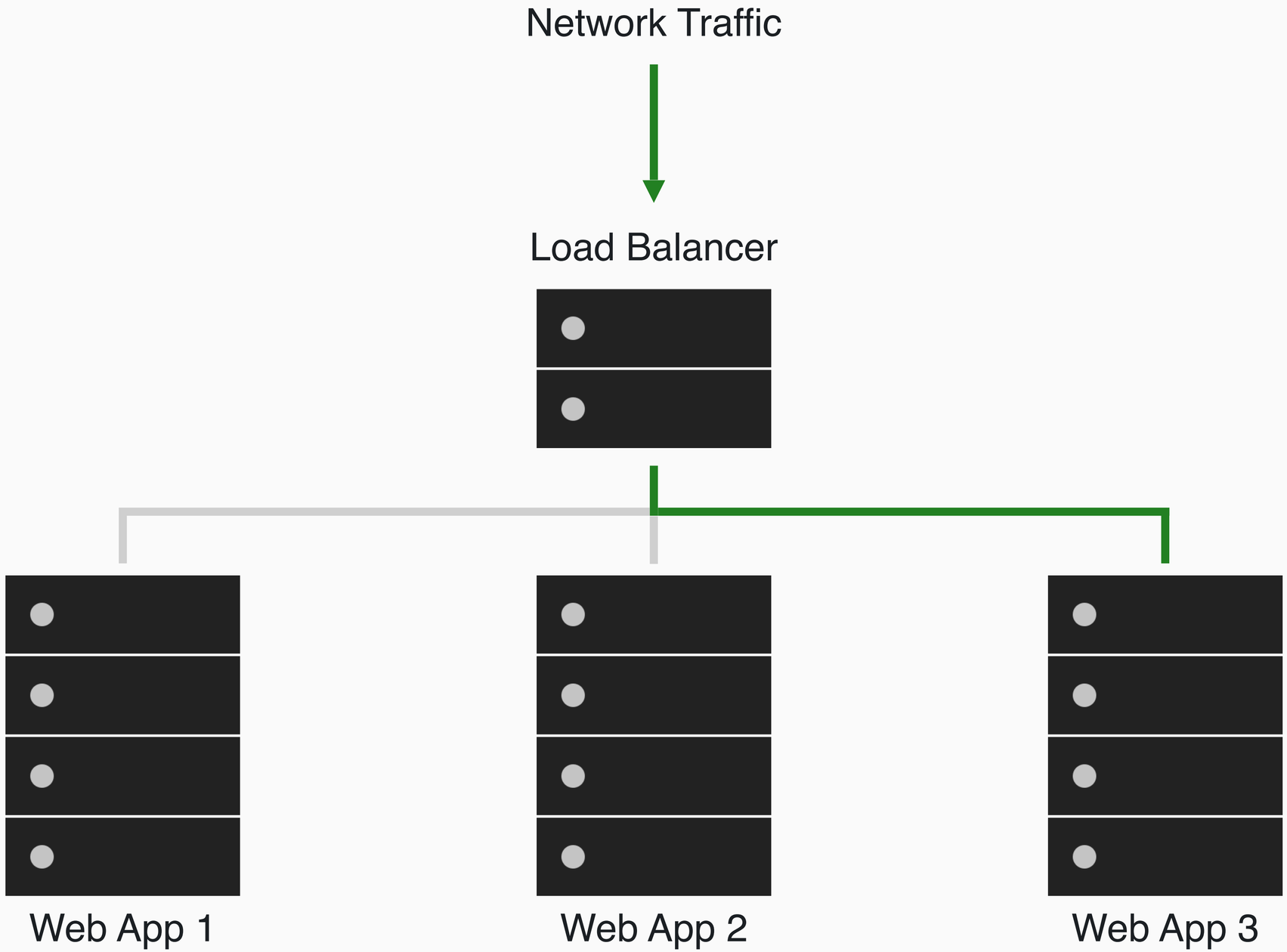
- Backups and crash-handling
  - Data resiliency
  - Application resiliency
- Systems management
- Scalability and load balancing

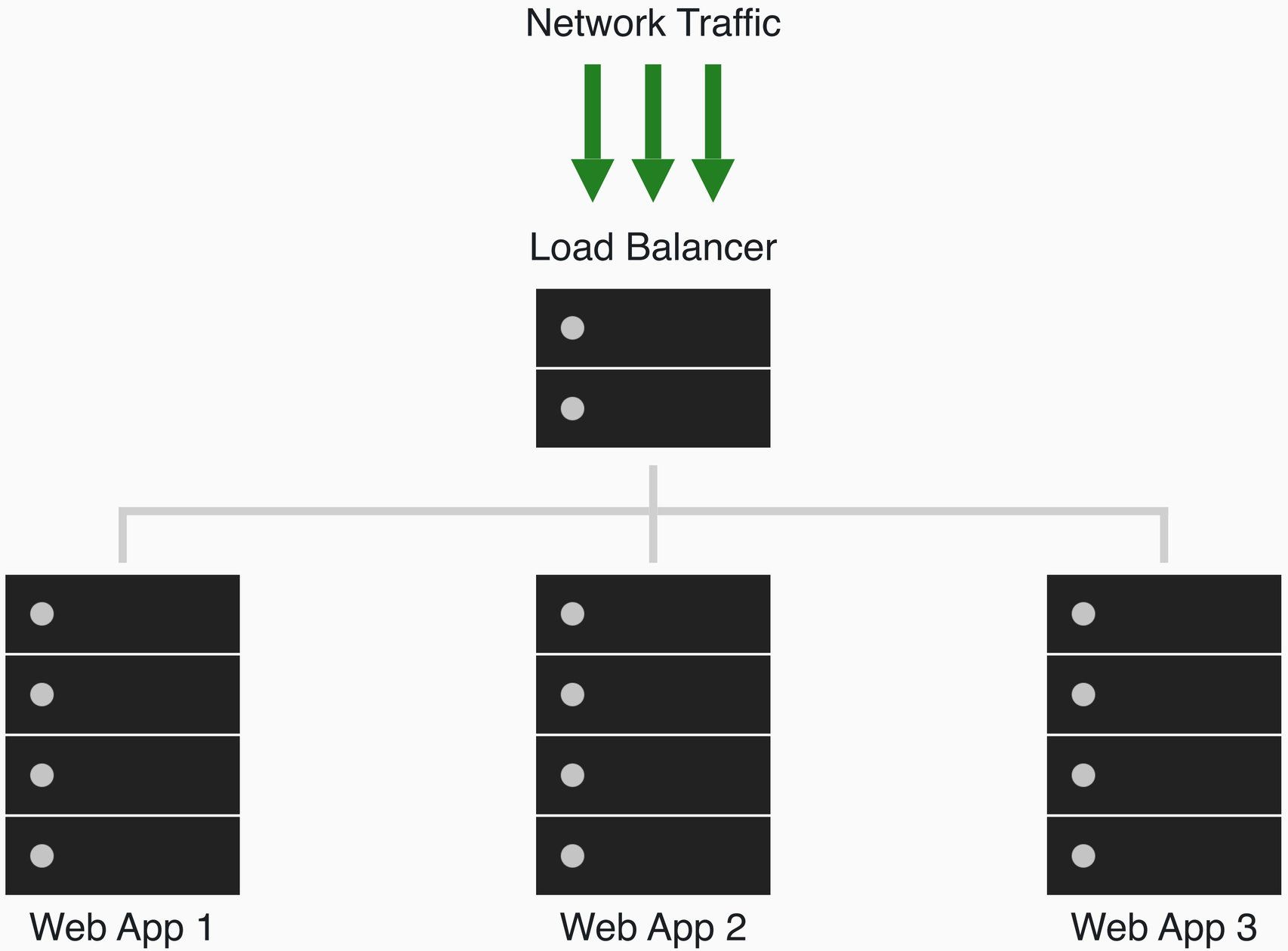

Load Balancer
Web App 1
Web App 2
Web App 3

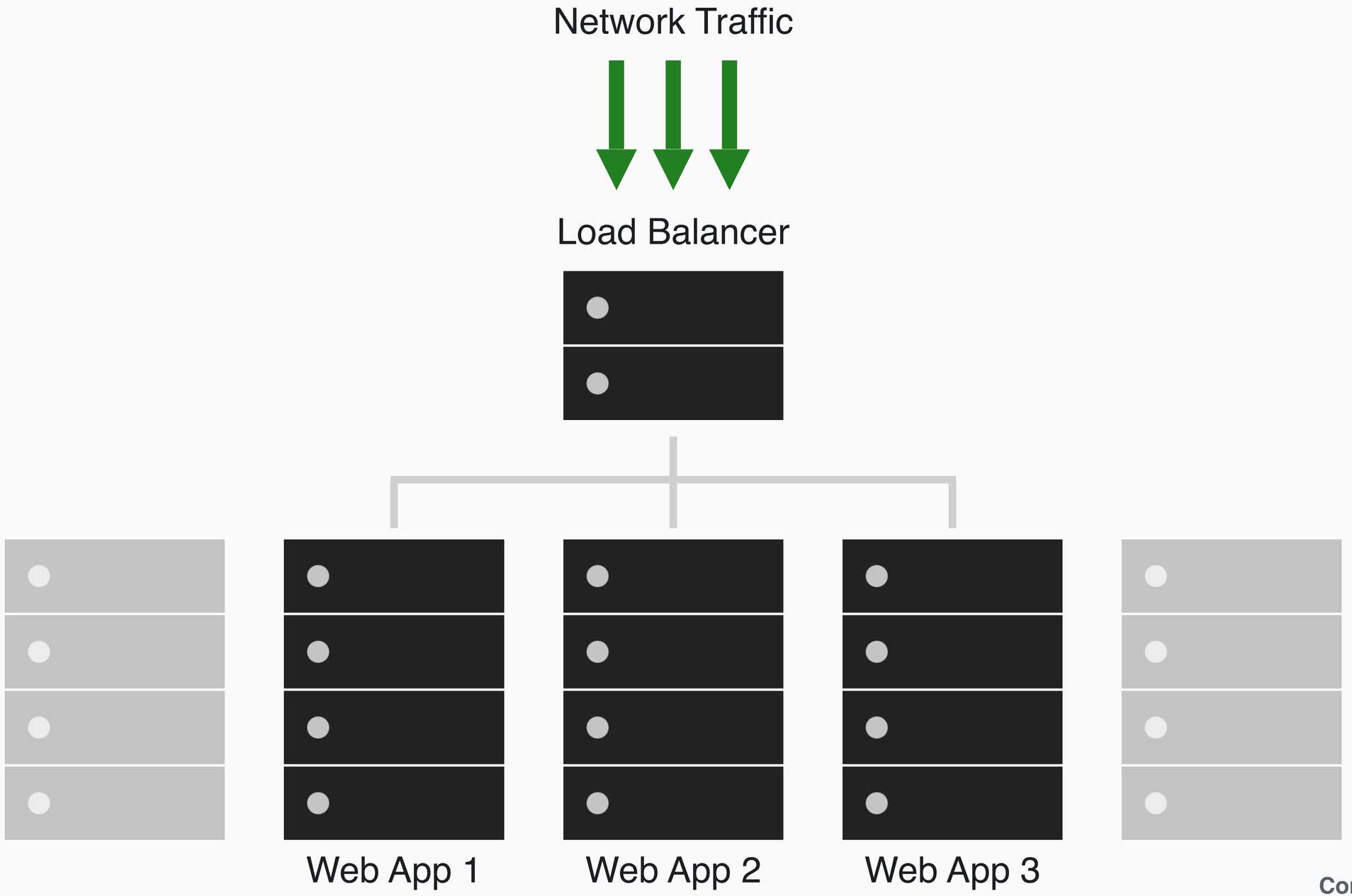

Network Traffic
Load Balancer
Web App 1
Web App 2
Web App 3

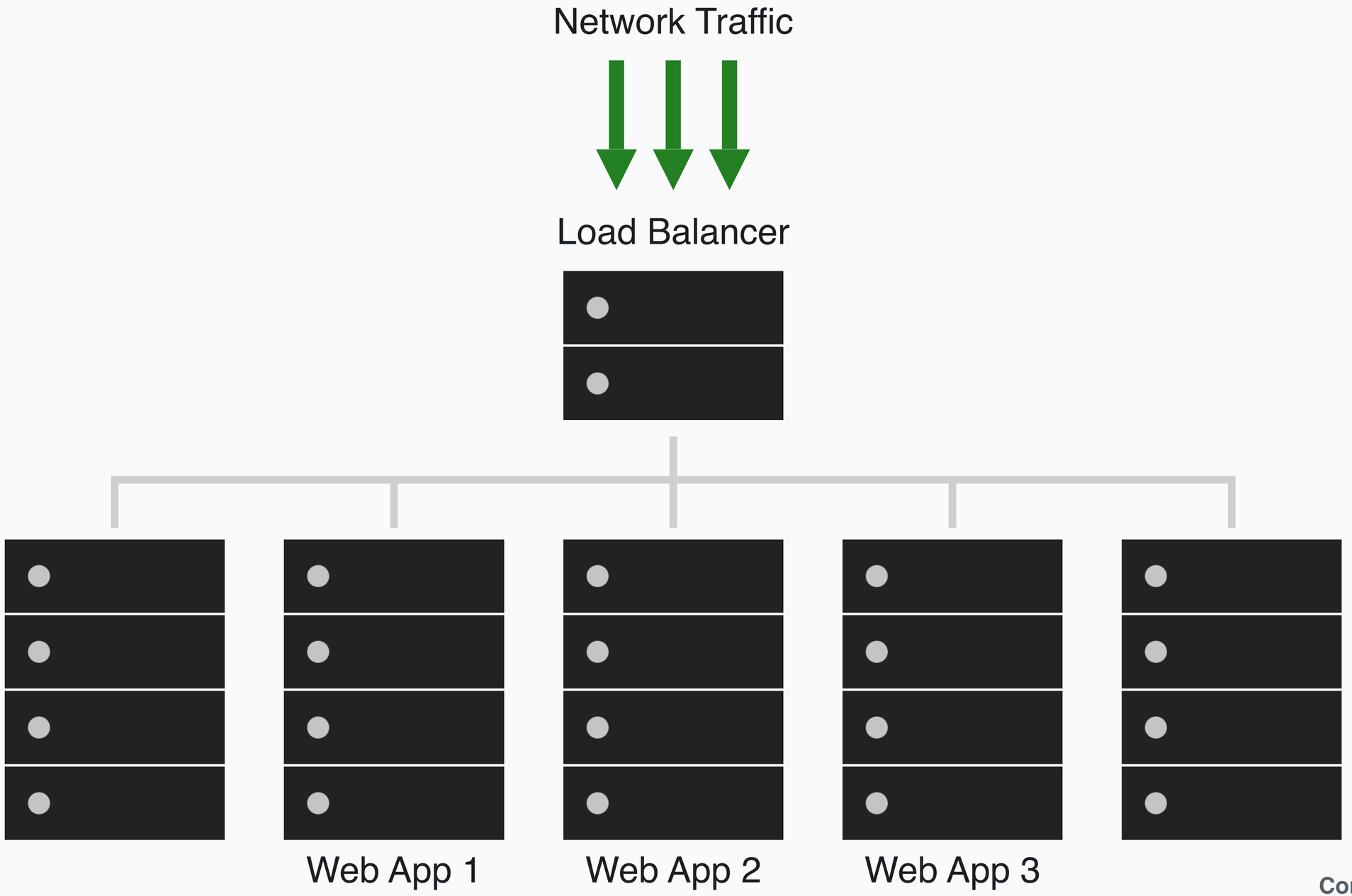

Network Traffic
Load Balancer
Web App 1
Web App 2
Web App 3


Network Traffic
Load Balancer
Web App 1
Web App 2
Web App 3


Network Traffic
Load Balancer
Web App 1
Web App 2
Web App 3


Network Traffic
Load Balancer
Web App 1
Web App 2
Web App 3


Network Traffic
Load Balancer
Web App 1
Web App 2
Web App 3


Network Traffic
Load Balancer
Web App 1
Web App 2
Web App 3

Demo