URL Shortener

1 Introduction and Goals

- Perform the necessary back-of-the-envelope calculations.

- Choose and justify the data storage scheme, the process for removing outdated links, the storage/update of statistics, and other necessary functional components.

- Choose and justify the server infrastructure, all necessary components, technologies, and libraries.

- Justify the reliability of the system.

- Choose and justify the release scheme and release tools.

- Formulate and justify the requirements for the development team.

- Choose and justify the environments and tools necessary for development.

- Choose and justify the hosting provider, estimate the costs for servers for all environments, including production.

1.1 Requirements Overview

- https://www.systeminterview.com/q=chatsystem&c=loggedin&v=v3&l=long is the original URL.

- Your service creates an alias with shorter length: https://url-shortener.com/y7keocwj. If you click the alias, it redirects you to the original URL.

1.2 Quality Goals

- **QG1:** 1 million new users per year, each user shortens an average of 100 links per year.

- **QG2:** The shortened links must be stored for 3 years.

- **QG3:** Redirection to the target address should occur in no more than 0.2 seconds.

- **QG4:** Click statistics must be tracked.

- **QG5:** System releases must occur seamlessly.

- **QG6:** The average link receives 10 visits per day.
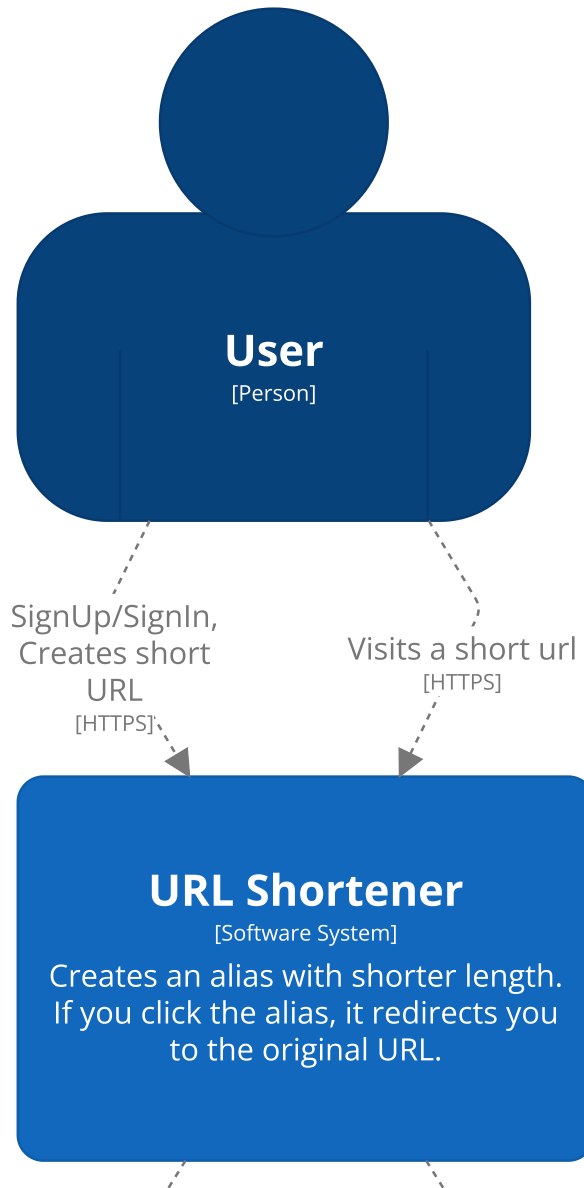
1.3 Stakeholders

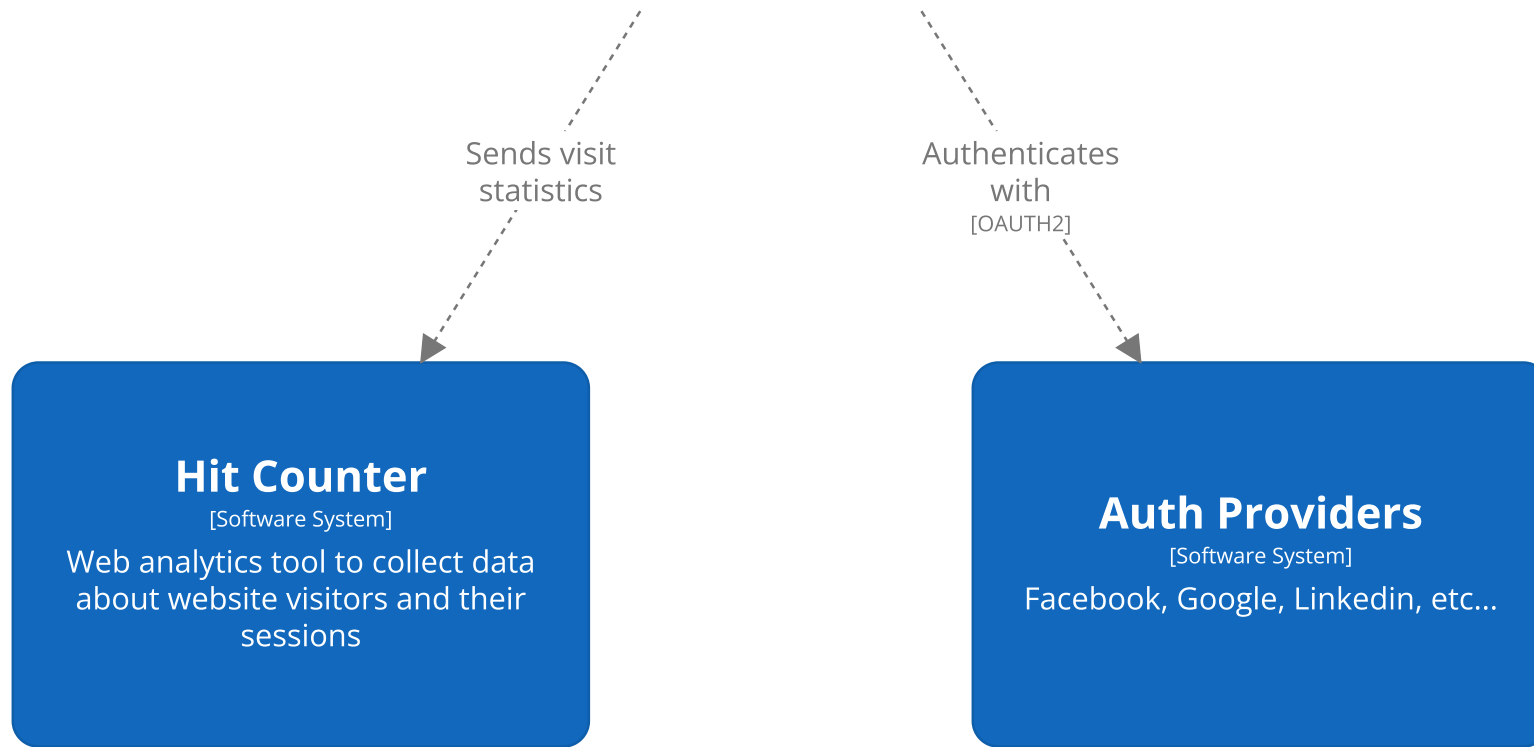| Role/Name	Contact	Expectations
<Role-1>	*<Contact-1>*	*<Expectation-1>*
<Role-2>	*<Contact-2>*	*<Expectation-2>*

2 Architecture Constraints

- The failure of any two nodes should degrade system performance by no more than 0.1 seconds.
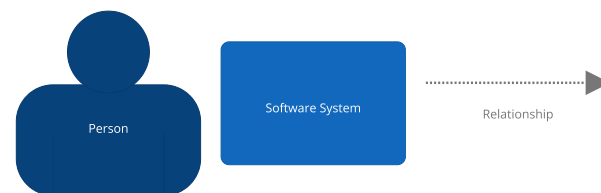
3 System Scope and Context
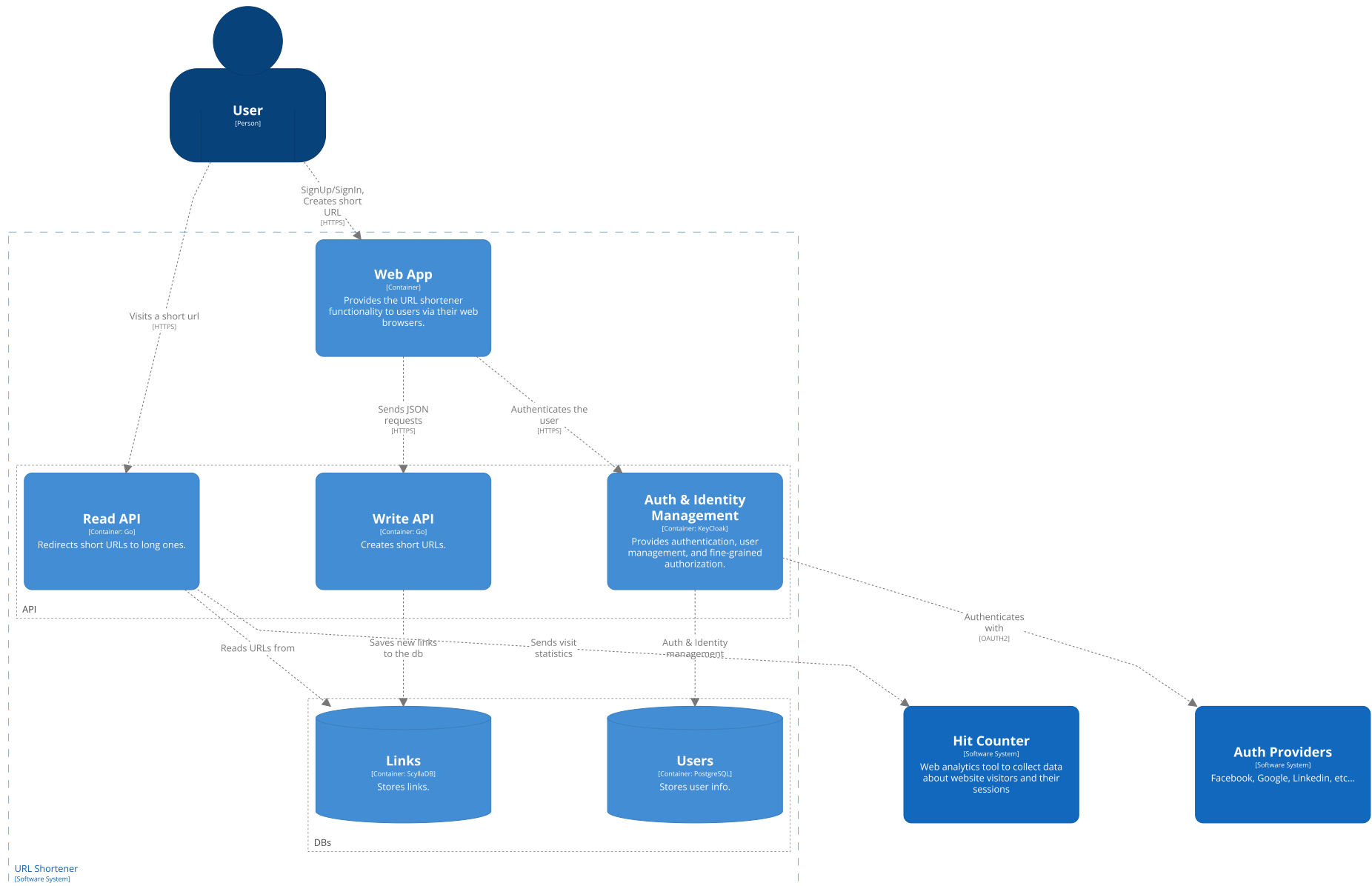
3.1 Business Context

Hit Counter
[Software System]

Web analytics tool to collect data about website visitors and their sessions

Sends visit statistics

Auth Providers
[Software System]

Facebook, Google, Linkedin, etc...

Authenticates with
[OAUTH2]

[System Context] URL Shortener

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Person

Software System

Relationship

3.2 Technical Context

User
[Person]

SignUp/SignIn,
Creates short
URL
[HTTPS]

Visits a short url
[HTTPS]

Web App
[Container]
Provides the URL shortener
functionality to users via their web
browsers.

Sends JSON
requests
[HTTPS]

Authenticates the
user
[HTTPS]

Read API
[Container: Go]
Redirects short URLs to long ones.

Write API
[Container: Go]
Creates short URLs.

**Auth & Identity
Management**
[Container: KeyCloak]
Provides authentication, user
management, and fine-grained
authorization.

API

Reads URLs from

Saves new links
to the db

Sends visit
statistics

Auth & Identity
management

Authenticates
with
[OAUTH2]

Links
[Container: ScyllaDB]
Stores links.

Users
[Container: PostgreSQL]
Stores user info.

DBs

Hit Counter
[Software System]
Web analytics tool to collect data
about website visitors and their
sessions

Auth Providers
[Software System]
Facebook, Google, Linkedin, etc...

URL Shortener
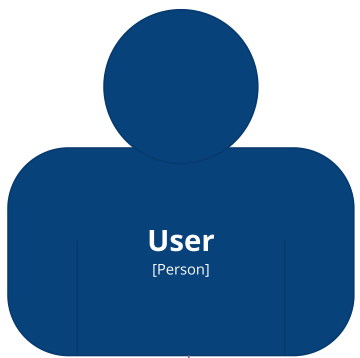[Software System]

[Container] URL Shortener
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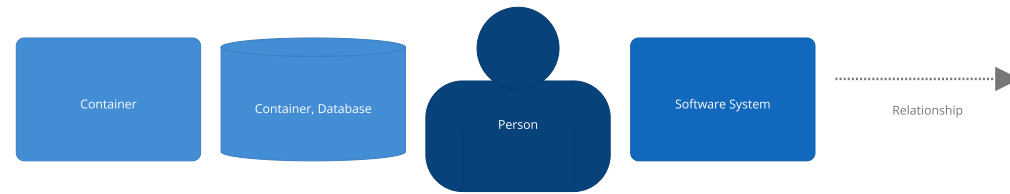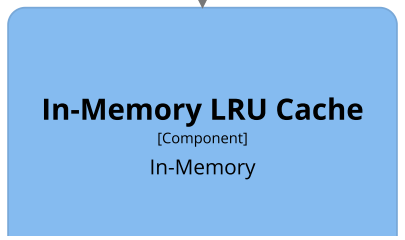
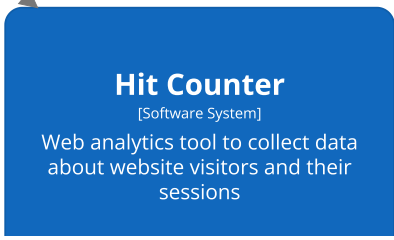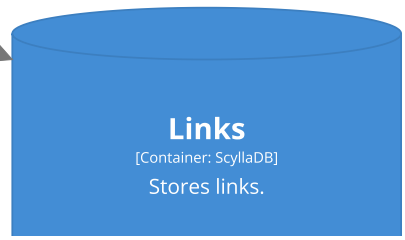# 4 Solution Strategy

5 Building Block View

5.1 Read API
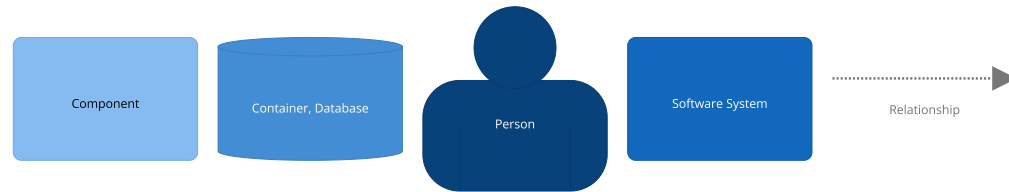
Read API
[Container]

[Component] URL Shortener - Read API
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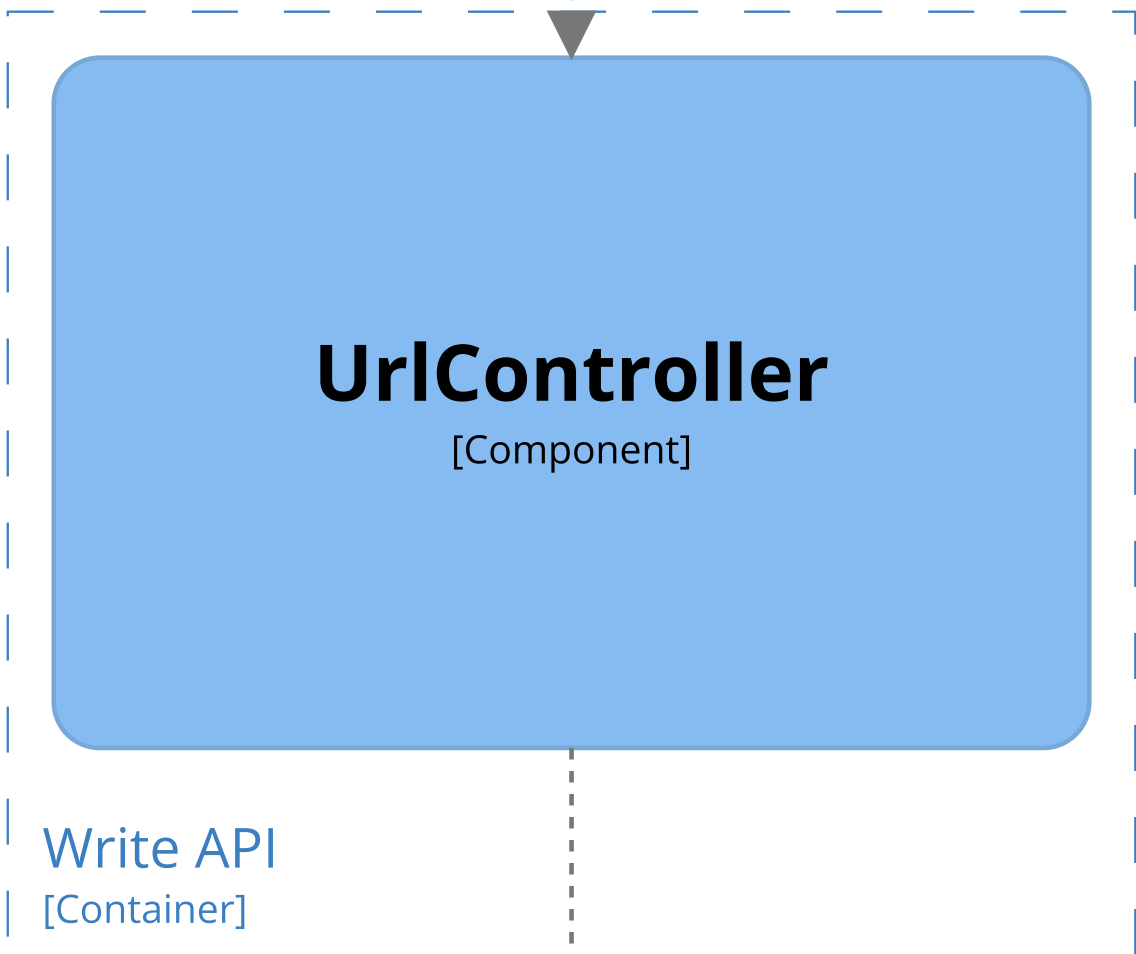| Component | Container, Database | Person | Software System | Relationship |

5.2 Write API

Web App

[Container]

Provides the URL shortener functionality to users via their web browsers.

Sends JSON
requests
[HTTPS]

UrlController

[Component]

Write API

[Container]

Saves new links

to the db

Links

[Container: ScyllaDB]

Stores links.
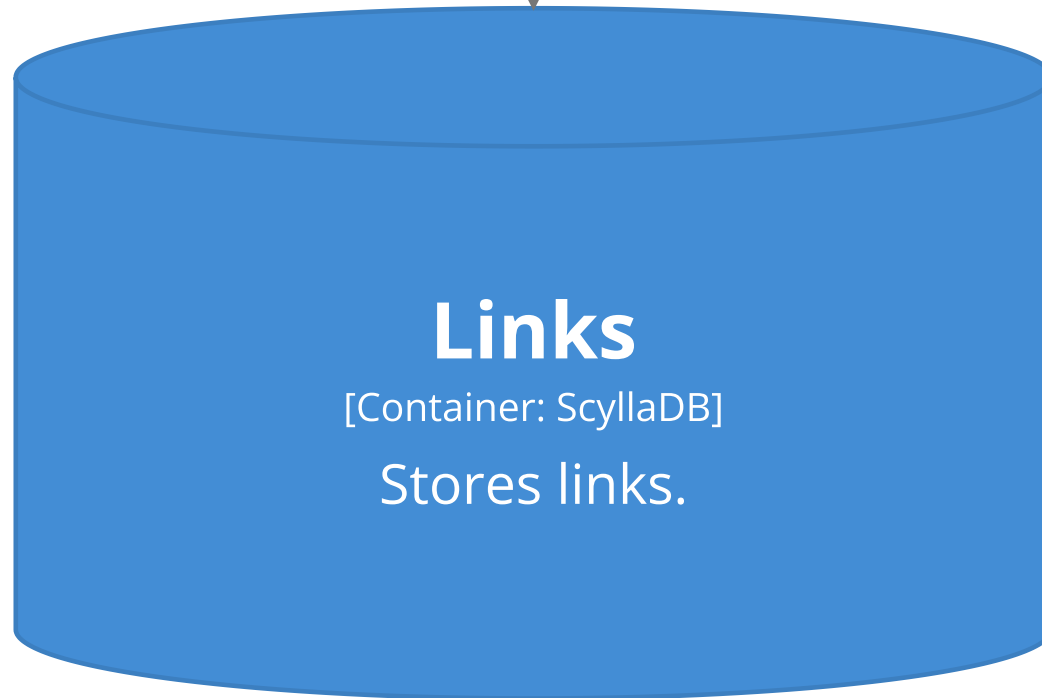
[Component] URL Shortener - Write API

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Component	Container	Container, Database	- - - - - - ▶ Relationship

6 Deployment View

6.1 Live

Web App
[Container]
Provides the URL shortener functionality to users via their web browsers.

Web
[Deployment Node: Linux]
x4
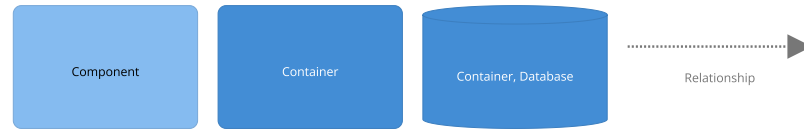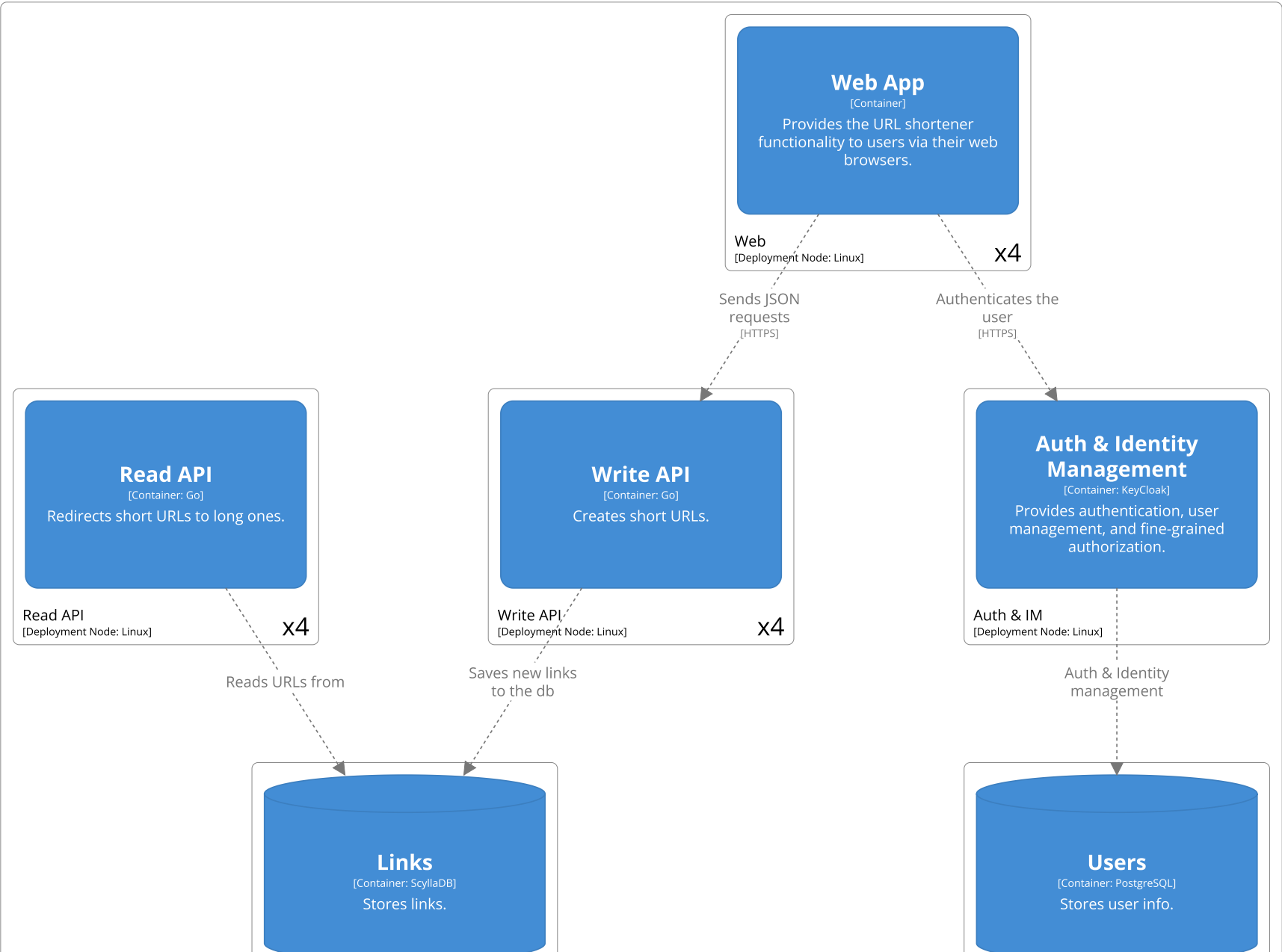
Sends JSON requests
[HTTPS]

Authenticates the user
[HTTPS]

Read API
[Container: Go]
Redirects short URLs to long ones.

Read API
[Deployment Node: Linux]
x4

Write API
[Container: Go]
Creates short URLs.

Write API
[Deployment Node: Linux]
x4

Auth & Identity Management
[Container: KeyCloak]
Provides authentication, user management, and fine-grained authorization.

Auth & IM
[Deployment Node: Linux]

Reads URLs from

Saves new links to the db

Auth & Identity management

Links
[Container: ScyllaDB]
Stores links.

Users
[Container: PostgreSQL]
Stores user info.
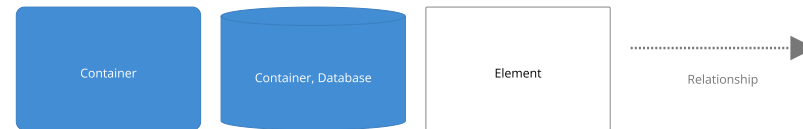
Link DB
[Deployment Node: Linux]   x3

User DB
[Deployment Node: Linux]

Account
[Deployment Node: Hetzner]

[Deployment] URL Shortener - Live
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Container	Container, Database	Element

Relationship

7 Cross-cutting Concepts

7.1 *<Concept 1>*

<explanation>

7.2 *<Concept 2>*

<explanation>

…

7.3 *<Concept n>*

<explanation>

8 Architecture Decisions

See [Architecture Decision Records](#).