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Design Problems

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RESHADED Approach for System Design

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Design a URL Shortening Service / TinyURL

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System Design: TinyURL

Let's design a service similar to TinyURL for shortening the uniform resource locator (URL).

We'll cover the following

- Introduction
 - Advantages
 - Disadvantages
- How will we design a URL shortening service?

Introduction#

URL shortening is a service that produces short aliases for long URLs, commonly referred to as **short links**. Upon clicking, these short links direct to the original URLs. The following illustration depicts how the process works:

How URL shortening service works

Advantages#

The key advantages of a URL shortening service are:

- Shortened URLs are convenient to use: they optimize link usage across different forms of devices due to their enhanced accessibility and non-breakability.
- They are visually professional, engaging and facilitate a higher degree of sharing possibilities.
- They are less error-prone while typing.
- They require smaller storage space at the user's end.

Disadvantages#

The URL shortening service has some associated drawbacks as well. Some of them are as follows:

- We lose the originality of our brand by using a short URL generated by a third-party service. Many different brands using the same service get short URLs containing the same domain.
- Since we're using a third-party service for URL shortening, the possibility of it getting shut down and wiping all our shortened URLs will always be there.
- Our business brand image depends on the trustworthiness of a URL shortening service. The wrong business move might negatively impact our business. The competition for acquiring the in-demand custom short URLs is immense, so it might be possible that the best custom URLs are already taken by the time we start generating short URLs.

How will we design a URL shortening service?#

We've divided the URL shortening service design into the following five lessons:

1. **Requirements:** This lesson discusses the functional and non-functional requirements of the URL shortening service, along with estimating the resources required to achieve these requirements. Moreover, it also lists down the fundamental building blocks needed to build such a service.

- 2. **Design and Deployment:** This explains the working and usage of each component, the linkage among them, and the overall working mechanism of them as a unit.
- 3. **Encoder:** This particular lesson unfolds the inner mechanism of the encoder used in the design, stating the reason we use it along with the mathematical explanation.
- 4. **Evaluation:** Lastly, we test our design by considering different dimensions of our design requirements and include the possibility of improving it.
- 5. **Quiz:** This lesson will test our understanding of the TinyURL design.

Let’s start by defining the requirements for a TinyURL-like URL shortening service.

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Quiz on Instagram’s Design

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Requirements of TinyURL's Design

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