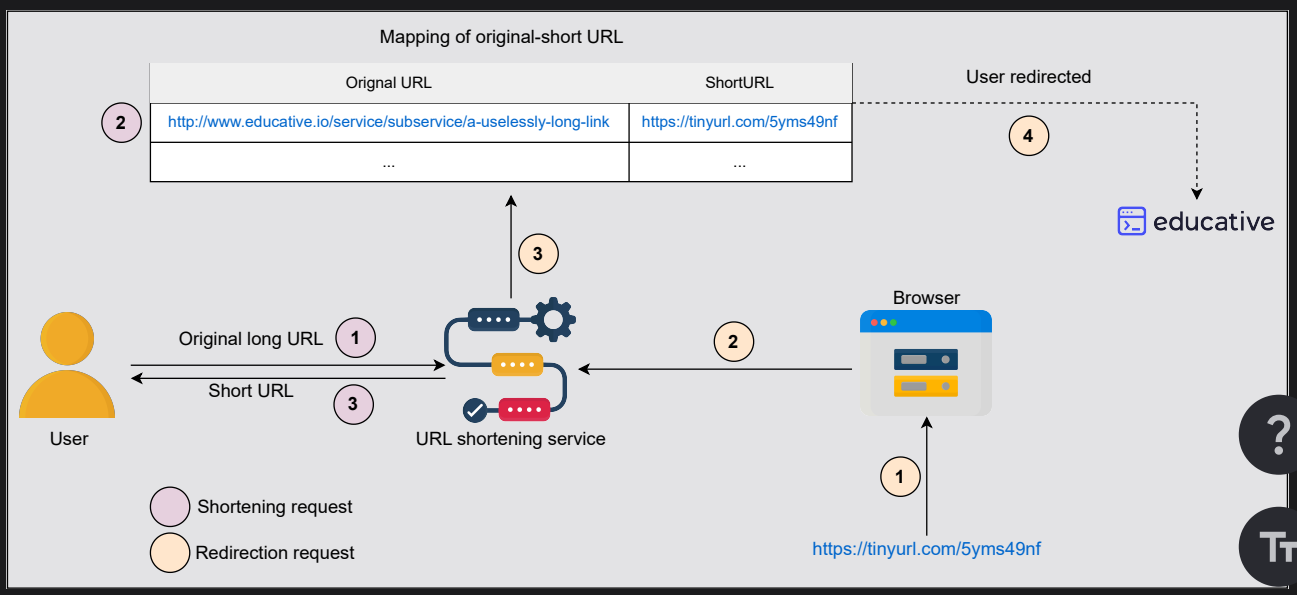
System Design: TinyURL

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

We'll cover the following

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.

Several building blocks can be considered for the system design of TinyURL. Recognize these building blocks based on the following requisite functionalities in the design and provide your answer in the AI widget given below:

- It's necessary to:

- Store the shortened URLs.
- Provide unique IDs for each URL.
- Store frequent URL-related requests to serve them efficiently.
- Limit the number of incoming requests.

Want to know the correct answer?

List four building blocks required for designing TinyURL service

H1 H2 H3 | B I | | | |

Use separate lines for each building block and mention why it is needed.

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.