Shortened URL

Jan 2022
Status: In Progress | **Ready for Review** | Final

Requirements

Provide a UI allowing users to convert a full URL to a shortened URL and vice versa.

- Allow the user to convert a full URL to a shortened URL.
- Allow the user to convert the shortened URL to the original URL.

Objective

Goals

- Provide a UI for users to get/resolve a shortened URL.

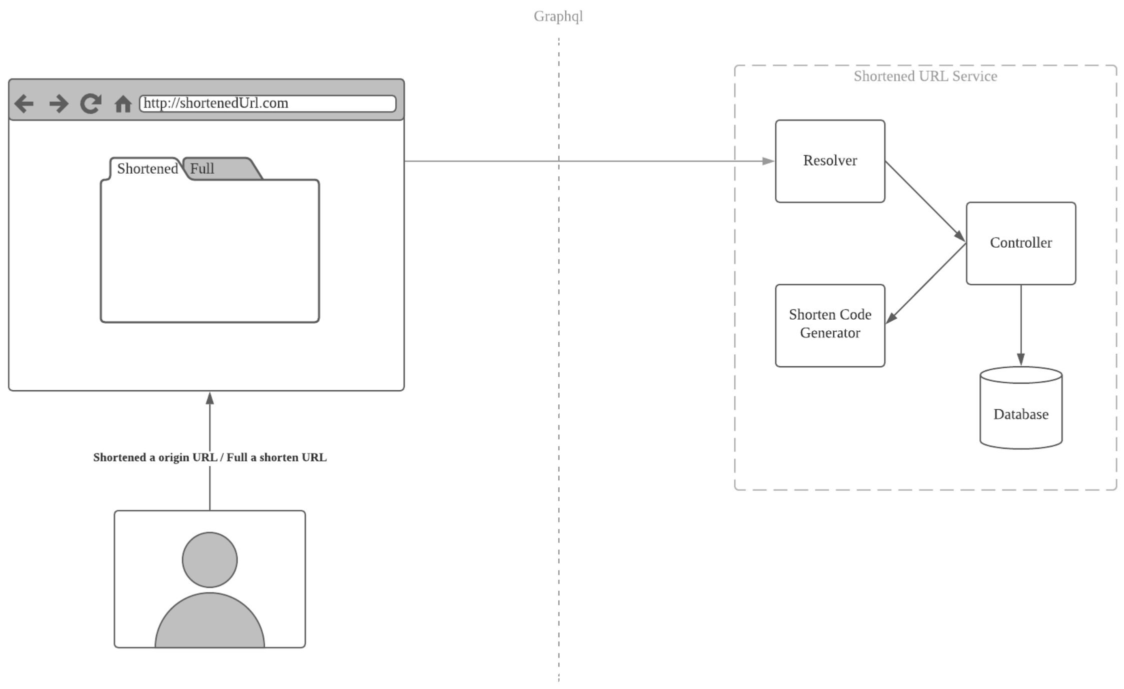
Non-Goals

- Don't require when the URL is input at the browser, the page will be directed.

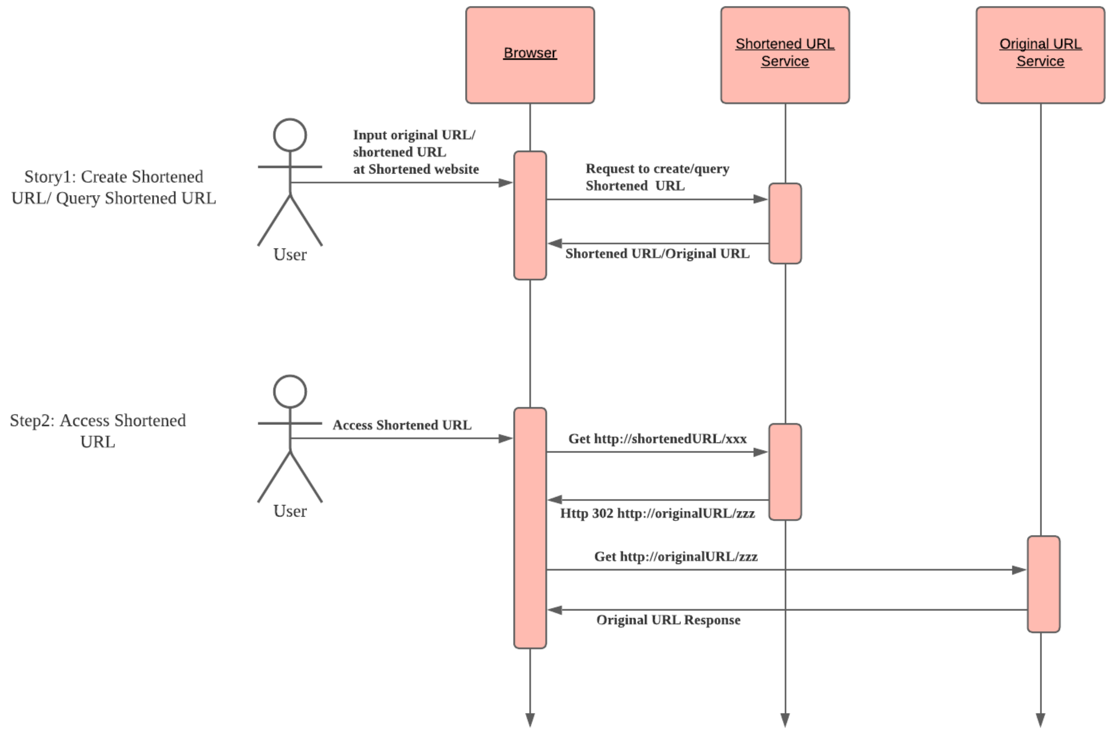
Tech Design

Architecture

Overview



User interaction sequence diagram


Browser
Shortened URL Service
Original URL Service
Story1: Create Shortened URL/ Query Shortened URL
User
Input original URL/ shortened URL at Shortened website
Request to create/query Shortened URL
Shortened URL/Original URL
Step2: Access Shortened URL
User
Access Shortened URL
Get http://shortenedURL/xxx
Http 302 http://originalURL/zzz
Get http://originalURL/zzz
Original URL Response

Shortened URL Generation Algorithm

We shall use this algorithm to map an original URL to a shortened URL, just like the mapping:

`x -> f(x)`

with two constraints:

1. If `x1 != x2`, then `f(x1) != f(x2)`;
2. the length of literal `f(x)` shall be less than `x`.

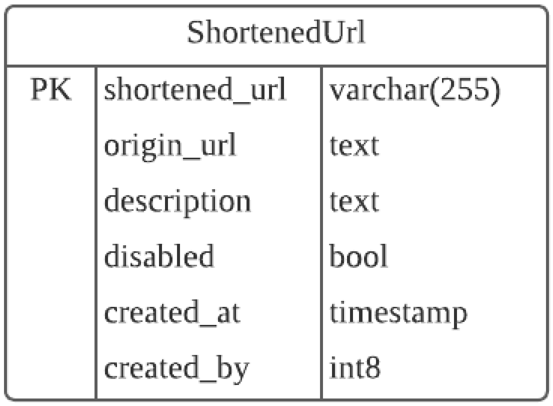
Based on the requirements, we can use Base64 to achieve the goal:

```
 private static final char[] base64URL = {
     'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L', 'M',
     'N', 'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'W', 'X', 'Y', 'Z',
     'a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'l', 'm',
     'n', 'o', 'p', 'q', 'r', 's', 't', 'u', 'v', 'w', 'x', 'y', 'z',
     '0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '-', '_'
};
```

And for user experience, the `f(x)` shall have the same length. For convenience, we can assume the length be 6, and the possible combination have: 6^64 = 6.334 * 10^49, which is huge enough.
Based on the above, we can put forward a algorithm like:

```
public String getShortenedUrl() {
    StringBuilder shortenedUrl = new StringBuilder();
    for (int i = 0; i < 6; i++) {
      shortenedUrl.append(base64URL[random.nextInt() % 64]);
    }
    return shortenedUrl.toString();
}
```

Database Model



ShortenedUrl		
PK	shortened_url	varchar(255)
	origin_url	text
	description	text
	disabled	bool
	created_at	timestamp
	created_by	int8

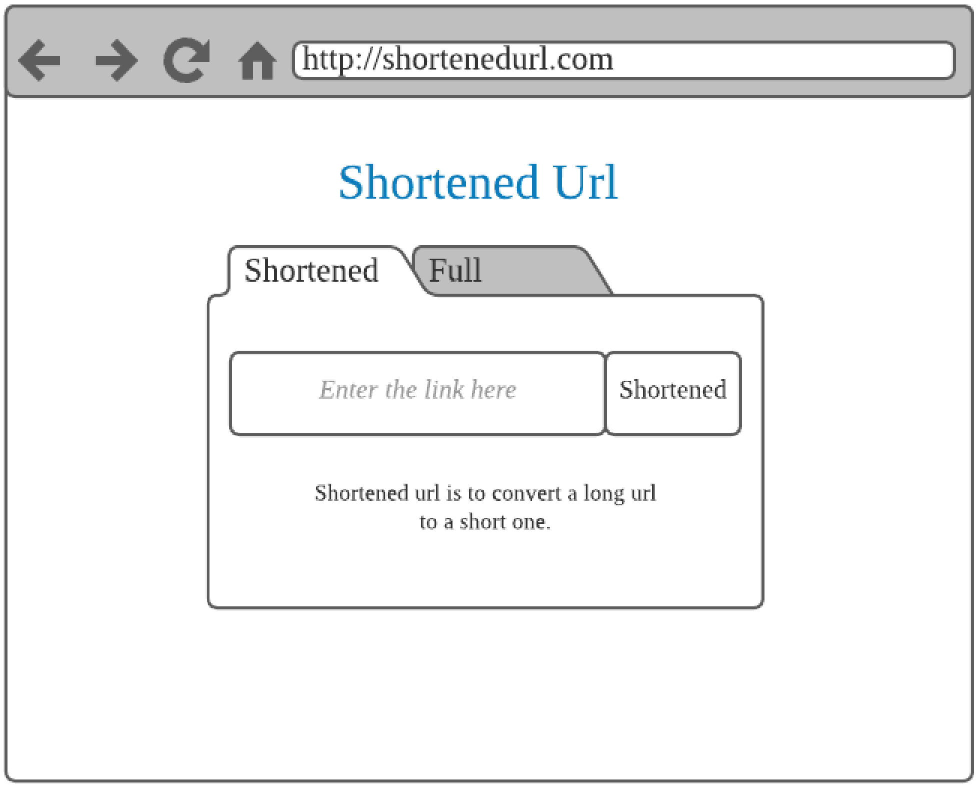
Hint: No-sql is also fine.

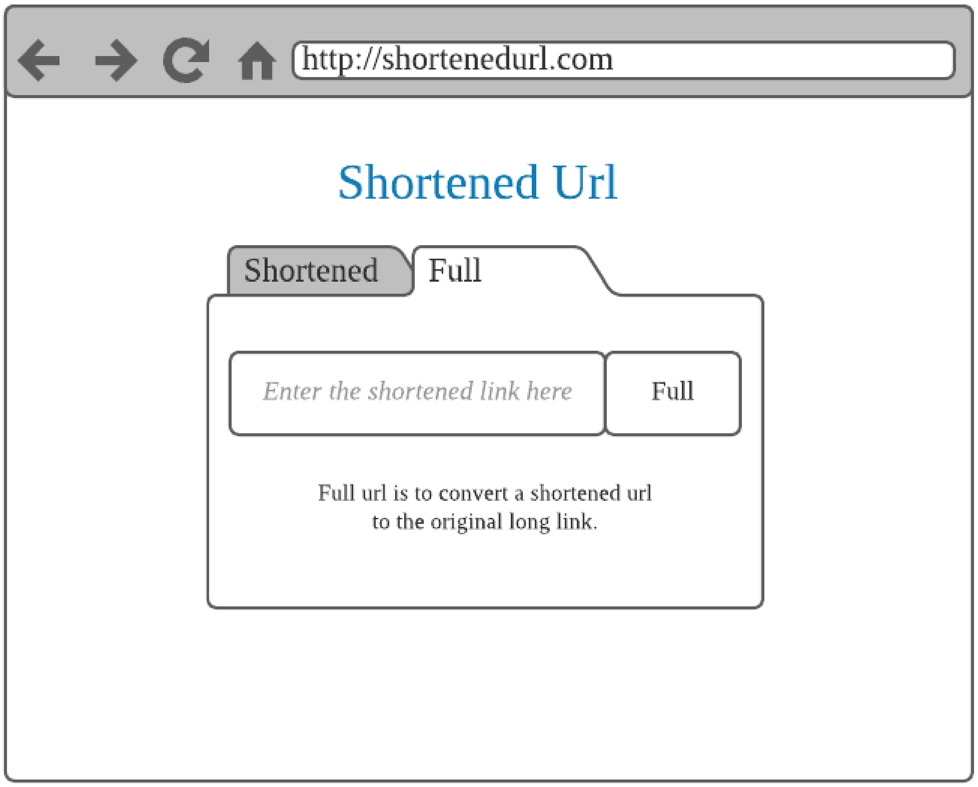
Frontend - Backend API

```
 public String createShortenedUrl(String originalUrl) {
    // Generate shortened url.
    // Create Shortened Entity(mapping: original url => shortened url).
    // return the shortened url.
 }
```

```
public String getOriginalUrl(String shortenedUrl) {
    // Get original url by the Primary Key: shortened url.
    // return the original url.
}
```

Frontend UI Desi




http://shortenedurl.com
Shortened Url
Shortened
Full
Enter the shortened link here
Full
Full url is to convert a shortened url
to the original long link.

Risks

- The performance of the Relationship database maybe not perform well under huge flow requests, we can consider using the Non-Sql(Redis, etc.)

Revision History

Date	**Reason for changes**
Jan 16, 2022,	Initiative.
