**SOURCE CODE:**

**import** java.util.HashMap;

**import** java.util.Map;

**import** java.security.MessageDigest;

**import** java.security.NoSuchAlgorithmException;

**public** **class** LinkShortener {

**private** Map<String, String> shortToLongMap;

**private** Map<String, String> longToShortMap;

**public** LinkShortener() {

**this**.shortToLongMap = **new** HashMap<>();

**this**.longToShortMap = **new** HashMap<>();

}

**private** String generateShortUrl(String longUrl) {

**try** {

MessageDigest md = MessageDigest.*getInstance*("MD5");

**byte**[] hashBytes = md.digest(longUrl.getBytes());

StringBuilder hexString = **new** StringBuilder();

**for** (**byte** b : hashBytes) {

hexString.append(String.*format*("%02x", b));

}

**return** hexString.substring(0, 8);

} **catch** (NoSuchAlgorithmException e) {

e.printStackTrace();

**return** **null**;

}

}

**public** String shortenUrl(String longUrl) {

**if** (longToShortMap.containsKey(longUrl)) {

**return** longToShortMap.get(longUrl);

}

String shortUrl = generateShortUrl(longUrl);

**while** (shortToLongMap.containsKey(shortUrl)) {

shortUrl = generateShortUrl(longUrl + System.*currentTimeMillis*());

}

shortToLongMap.put(shortUrl, longUrl);

longToShortMap.put(longUrl, shortUrl);

**return** shortUrl;

}

**public** String expandUrl(String shortUrl) {

**return** shortToLongMap.getOrDefault(shortUrl, "Short URL not found");

}

**public** **static** **void** main(String[] args) {

LinkShortener linkShortener = **new** LinkShortener();

String longUrl = "[https://www.example.com](https://www.example.com/)";

String shortUrl = linkShortener.shortenUrl(longUrl);

System.***out***.println("Shortened URL: " + shortUrl);

String expandedUrl = linkShortener.expandUrl(shortUrl);

System.***out***.println("Expanded URL: " + expandedUrl);

}

}

**OUTPUT:**

Shortened URL: e149be13

Expanded URL: [https://www.example.com](https://www.example.com/)