Account Enumeration Vulnerability: `amoremi.ee`

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1 Introduction

Account enumeration is a security vulnerability enabling attackers to determine if specific user accounts exist on a service. The vulnerability usually lies in the account registration functionality of a service, where an error message is returned, indicating that a user with the specified account identifier is already registered. However, an online service can also leak this information in other, more subtle ways, which are often overlooked by software developers.

On 2025-05-02, we reassessed `amoremi.ee` and found that despite significant changes, **the service is still vulnerable to account enumeration**. Since the initial findings have been already addressed, this report will now highlight the more subtle residual hints of account existence that were identified. For example, even without a direct message, small visual differences in responses, or slight variations in how the server behaves (like the exact data returned) for existing versus non-existing accounts, can still reveal if an account is registered.

If the account identifier of an online service is personal data (e.g. email address, personal code etc), then the fact, whether it is associated to an account, is also considered personal data. Any disclosure of personal data to third parties without a legal basis constitutes a data breach [1].

We advise you to investigate the potential data breach, and notify the supervisory authority and the affected data subjects, if necessary. After **2025-06-17**, we will reassess the service and notify the Estonian Data Protection Inspectorate in case the vulnerability has not been mitigated. Detailed guidelines for mitigating this type of flaw are available in [2].

2 Vulnerabilities Found

We tested the login form, password reset form, account registration form and email change form of `amoremi.ee`. No issues appeared on the login form, password reset form and account registration form. However, we identified security issues on the email change form. The vulnerabilities found are described in more detail in subsections below.

2.1 Email Change Form

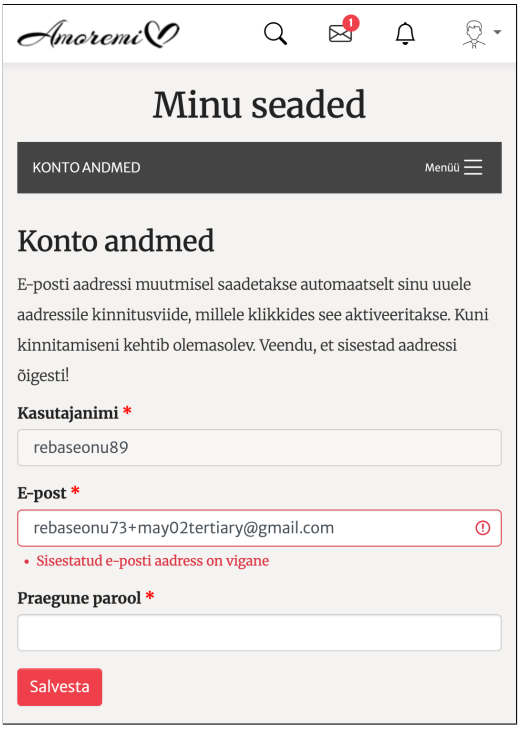

Figure 1: The vulnerability in the email change form

The email change form is susceptible to account enumeration attacks. This is because when the provided email address is already taken, the form shows an error message (see Figure 1). Additionally, the form appears to lack anti-bot measures such as CAPTCHA, enabling attackers to easily automate these attacks [3].

It is also crucial to eliminate any side-channels that an attacker could exploit to differentiate between account existence and non-existence. For example, the response should not be faster for an existing account than for an email with which an account does not exist.

To mitigate the flaw, the response must be uniform for both registered and unregistered email addresses. This uniformity must apply to the message displayed to the user as well as the underlying HTTP response details (like status codes, headers, and body content).

For example, the indistinguishable user-facing message could be: "We have sent further instructions to the provided new email address". Send an email in both cases, but differentiate the content based on account existence. For example, if the email is unused, provide means for confirming the new email, but if the email is used, provide means for account recovery.

About This vulnerability report is part of an ongoing study on user enumeration vulnerabilities in Estonian online services. The study is conducted by the University of Tartu master's student Gregor Eesmaa (supervised by Arnis Paršovs - arnis.parsovs@ut.ee). The findings of this study will be published in a master's thesis scheduled for defence in August 2025.

References

[1] European Union. *General Data Protection Regulation (GDPR): Regulation (EU) 2016/679*. Official Journal of the European Union, L 119/1. 2016. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R0679.

[2] OWASP. *Authentication Cheat Sheet - Authentication and Error Messages*. Accessed: 2025-01-26. URL: https://cheatsheetseries.owasp.org/cheatsheets/Authentication_Cheat_Sheet.html#authentication-and-error-messages.

[3] OWASP. *Authentication Cheat Sheet - Protect Against Automated Attacks*. Accessed: 2025-01-26. URL: https://cheatsheetseries.owasp.org/cheatsheets/Authentication_Cheat_Sheet.html#protect-against-automated-attacks.