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# **System Design Description**

**for**

# **Blockchain Voting System**

**Version 1.0 approved**

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**Riga Technical University**

**06.04.2025**

## Revision History

Name	Date	Reason For Changes	Version
Initial Version	06.04.2025	-	1.0

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# BLOCKCHAIN VOTING SYSTEM

## SOFTWARE DESIGN DESCRIPTION

Version: 1.0  
Date: 06.04.2025  
Riga Technical University  
Faculty of Computer Science and Information Technology  
Institute of Applied Computer Systems

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### 1. Introduction

#### 1.1. Definitions of the Abbreviations

Abbreviation	Description
BVS	Blockchain Voting System
RTU	Riga Technical University
ID	Identity Document
OTP	One-Time Password
UI	User Interface
SRS	Software Requirements Specification

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#### 1.2. Purpose of the Document

This document describes the detailed design of the **Blockchain Voting System**, which provides a secure, decentralized, and transparent platform for casting and counting votes during digital elections. The document is intended for:

- **RTU lecturers** responsible for academic oversight;
- **Developers and engineers** responsible for implementation;
- **System testers** responsible for validating the functionality;
- **Auditors** ensuring trust in vote integrity.

1.3. Related Documents

No.	Document
[1]	Project Task: “Development of Web Applications”
[2]	Software Requirements Specification for Blockchain Voting System (2025)

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1.4. Overview of the Document

This document contains:

- Section 2: Detailed design of the user interface;
  - Section 3: System decomposition and data structure;
  - Section 4: Election result reporting system.
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1.5. Traceability Table


Identifier	Feature Description	Reference Section
BVS-1	User authentication	2.1
BVS-2	Voter registration	2.5, 2.6
BVS-3	Voting interface	2.9
BVS-4	Vote encryption & blockchain logging	3.2.3
BVS-5	Election result reporting	2.4, 2.8
BVS-6	Vote verification interface	2.12

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2. Detailed Design of the Client Interface

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2.1. Authorization Form



Valsts ierēnumu dienests


Blockchain Voting System


LV

EN

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Connect using...






Internet Banking Authentication

EDS username and password

Connect to other systems


Registration of non-EU registered economic operators under the VAT special scheme (OSS)

To connect to the public database of the State Revenue Service 

To connect to European information systems

Verification of the status of customs declarations

### 2.1.1 Input Parameters



Valsts ierēnumu dienests

Blockchain Voting System

LV

EN

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[< To home page](#)

Connect to

User name

Password

Connect to

Forgot my password

 67120000

 [Processing personal data in the SRS](#)

 [Become a user](#)

 [Terms of use](#)

 [Cookie Use Policy](#)

 [Accessibility](#)



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EUROPAS SAVIENĪBA

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REGULĀCIJAS TĀVĀ NĀKOTNĒ

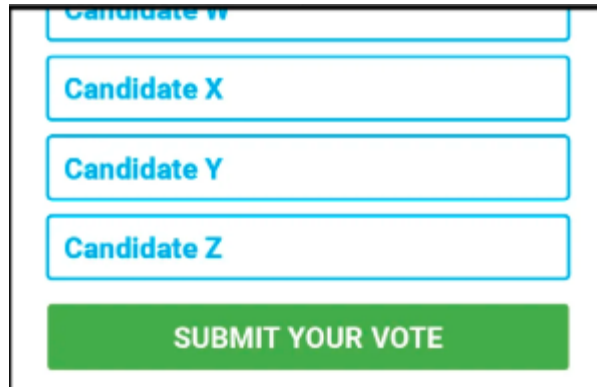
Version 27.0.34.7, [www.vkd.gov.lv](http://www.vkd.gov.lv)

### 2.1.2 Function Description

- The system verifies identity via national ID database;
- If valid, session is created with JWT and the **Main Menu** form opens;
- In case of invalid inputs, an error message appears.

## 2.2. Main Menu

### 2.2.1 Function Description



Button	Action
Submit Your Vote	Opens the ballot voting form
Logout	Ends session and returns to login
Reveal my vote	This action adds a vote to a candidate. (This button is only enabled after the end of voting)

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## 2.3. Voting Interface (Ballot Form)

### 2.3.1 Function Description

- Shows list of eligible candidates;
  - Allows voter to select only one and submit;
  - Triggers vote encryption and blockchain recording. This action takes a deposit to ensure anonymity
  - Reveal vote launches blockchain function call to add a vote to candidate
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## 2.4. Result Viewing Interface

Election Results	
Name	Votes
Candidate 1	1
Candidate 2	0
Your Account: 0xc0ac490601d35ce0c83bc067d7a57ec3568068cd	

#### 2.4.1 Function Description

- Only available **after election ends**;
- Viewable by all users including auditors.

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### 2.5. Voter Management (Admin Only)

#### 2.5.1 Function Description

- View and filter eligible voters;
- Manually add or remove voters;
- Import voter data (.CSV or .XLSX);
- All changes require administrator authentication.

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### 2.6. New Voter Registration

Field Name	Type	Required	Description
Full Name	Text	Yes	Legal voter name
National ID	Text	Yes	Unique voter identifier
Email	Text	Yes	For 2FA and communication

Voting Region    Dropdown    Yes            User's registered district

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## **2.9. Vote Casting**

### **2.9.1 Input Parameters**

<b>Field</b>	<b>Type</b>	<b>Required</b>	<b>Description</b>
Candidate	Selection Box	Yes	Choose from candidate list
Confirm Vote	Button	Yes	Confirms and encrypts vote

### **2.9.2 Function Description**

- The vote is signed with a private key;
  - Sent to blockchain node for permanent storage;
  - Returns transaction hash as a digital receipt.
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## **2.12. Vote Verification**

- Users input their **receipt hash**;
  - System checks blockchain for matching record;
  - Displays date/time and candidate choice (anonymized).
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## **3. Description of the Decomposition**

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### **3.1. Database ER Model**

- Will include entities like **Personal number, Hashed password, Dob and email**  
(Diagrams to be attached)
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## **3.2. Description of the Database**

### **3.2.1. Voters Table**

<b>Field Name</b>	<b>Type</b>	<b>Description</b>
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id	int	Unique identifier
name	varchar(255)	Voter's full name
personal_number	varchar(20)	National ID
email	varchar(255)	Email for OTP

Eligible_voter	
PK	<u>voter_id</u>
	personal_number
	hashed_password
	dob
	email

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## 4. Reports

### 4.2. Email Notification about voting

Users will receive an email from the system notifying that their vote has been recorded and they were charged with a deposit that will be refunded to them in the Revealing vote stage.

### 4.1. Email Notification about voting end

Users will receive an email from the system notifying that elections has been ended and they can check the results