TECHNOLOGIJŲ FAKULTETAS
INŽINERIJOS IR INFORMATIKOS KATEDRA

TEMOS PAVADINIMAS

Kursinis darbas

Informatikos studijų programos
valstybinis kodas 6531BX004
Informatikos studijų krypties

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INTRODUCTION

Purpose. To master data structures, databases, graphical user interface programming, the application of design patterns, version control, documentation, and testing tools while developing a cohesive domain-specific application.

To achieve the intended goal, the following practical tasks are set:

1. Design a software system:
   1.1 Design the initial system data and output;
   1.2 Define the data structures used in the program;
   1.3 Describe the structure of the software project;
   1.4 Select and apply design patterns when designing the architecture.
2. Develop the software system:
   2.1 Implement data input/output flows;
   2.2 Implement the program's calculation algorithms;
   2.3 Implement the graphical user interface (GUI);
3. Ensure the management of the software system development process and quality assurance:
   3.1 Create automated tests for code validation;
   3.2 Use version control tools for the code.

The development of the programming course project was based on the provided minimum requirements table (see Table 1).

1 Table: Minimum Requirements Table

Minimum requirements:	**Filled in by the teacher**
Adherence to code naming conventions	
The report is free of grammatical or formatting errors	
The code and report are provided on GitLab	
The report contains all the sections of the given template filled out	
Each section of the report clearly indicates where in the code the result is implemented	

It was also based on the evaluation criteria table (see Table2).

2 Table. Evaluation criteria table

Evaluated section (chapter in the report)	**Value**	**5-6**	**7-8**	**9-10**
Database Design (1.1)	5 %	A database with at least 3 tables (each with a minimum of 20 records and at least 3 fields).	A database with at least 4 tables (each with a minimum of 20 records and at least 3 fields). Use multiple types of relationships.	There is reading from the database with at least 4 tables (each with a minimum of 20 records and at least 3 fields). Multiple types of relationships are used. The Lithuanian language character encoding has been properly handled.

Data Objects (1.2.1)	5 %	At least one data object is used, consisting of a minimum of 3 properties.	Multiple data objects are used, or a single composite data object is worked with.	Multiple data objects are used, and at least one of them is a composite data object.
Data Structures (1.2.2)	10 %	One data structure is selected, and its suitability is justified.	Multiple data structures are used, with their own combination defined. Alternatively, there is the possibility to extend them with new objects.	Multiple data structures are used, with their own combination defined, and there is the possibility to extend them with new objects.
Software Project (1.3)	5 %	The software project and the technologies used are described.	The software project and the technologies used are described, and the complete architectural model of the project is specified.	The software project and the technologies used are described, the complete architectural model of the project is specified, and the operational algorithm models are described.
Design Patterns (1.4)	10 %	In the program code, one creation, structural, and behavioral design pattern is applied.	In the program code, 5 design patterns are applied: one each from the creation, structural, and behavioral categories.	In the program code, 7 design patterns are applied: at least 2 from each category: creation, structural, and behavioral patterns.
JPA Implementation (Java Persistence API) (2.1)	5 %	JPA is configured using Hibernate or an alternative framework. At least one entity is created, and CRUD operations are performed.	JPA is configured using Hibernate or an alternative framework. At least one more complex entity structure is created (one entity consists of several others, and one entity must obligatorily reference another, etc.).	JPA is configured using Hibernate or an alternative framework. Several more complex entity structures are created (one entity consists of several others, and one entity must obligatorily reference another, etc.).
DB Queries (2.1)	7 %	All CRUD operations are performed.	Compound queries involving multiple parameters or multiple DB tables are performed.	Compound queries involving multiple parameters and multiple DB tables are performed.
Algorithms (2.2)	8 %	One operation is performed from: Searching for items in a collection, Selection (filtering) of elements in a collection, Sorting items in a collection.	Two operations are performed from: Searching for items in a collection, Selection (filtering) of elements in a collection, Sorting items in a collection.	Three operations are performed: Searching for items in a collection, Selection (filtering) of elements in a collection, Sorting items in a collection.
Graphical user interface (2.3)	10 %	There is a graphical user interface that displays and manipulates the data.	There is a composite graphical user interface that displays and manipulates the data.	There are several different composite GUIs (mobile app, web, etc.) that display and manipulate data.
Testing (3.1)	4 %	The created code is tested with automatic tests (coverage 20%).	The created code is tested with automatic tests (coverage 50%).	The created code is tested with automatic tests (coverage 70%).
	3 %	At least 3 types of assert methods are used.	At least 4 types of assert methods are used.	At least 5 types of assert methods are used.
	3 %	At least 3 types of	At least 4 types of	At least 5 types of annotations are

		annotations are used.	annotations are used.	used.
	4 %	One of the testing categories was implemented: Exception testing, Performance testing, Parametrized tests.	Two of the testing categories were implemented: Exception testing, Performance testing, Parametrized tests.	Three of the testing categories were implemented: Exception testing, Performance testing, Parametrized tests.
Code version control (3.2)	8 %	Minimum 25% weekly code submissions.	Minimum of 50% weekly code submissions.	Minimum of 75% weekly code submissions
Rationale for decisions (List of information sources)	13 %	At least 5 scientific sources are cited during design and implementation.	At least 8 scientific sources are cited during design and implementation.	When designing and implementing, cite at least 10 scientific sources.

1. SOFTWARE SYSTEM DESIGN

Text.

1.1. Database Design

Text.

1.2. Data Used

Text.

1.2.1. Data Objects

Text.

1.2.2. Data Structures

Text.

1.3. Software Project

Text.

1.4. Design Patterns

Text.

2. SOFTWARE SYSTEM IMPLEMENTATION

Text.

2.1. JPA Implementation (Java Persistence API)

Text.

2.2. DB Queries

Text.

2.3. Algorithms

Text.

2.4. Graphical User Interface (GUI)

Text.

3. SOFTWARE SYSTEM QUALITY ASSURANCE

3.1. Testing

Text.

3.2. Code Version Control

Text.

CONCLUSIONS

1. Conclusion.
2. Conclusion.
3. Conclusion.

LIST OF REFERENCES AND OTHER SOURCES OF INFORMATION

1.