**Kauno technologijos universitetas**

Informatikos fakultetas

# Objektinis programavimas 2 (P175B123)

Laboratorinių darbų ataskaita

**Normantas Stankevičius IFF-1/4**

Studentas

**Prof. Vacius Jusas**

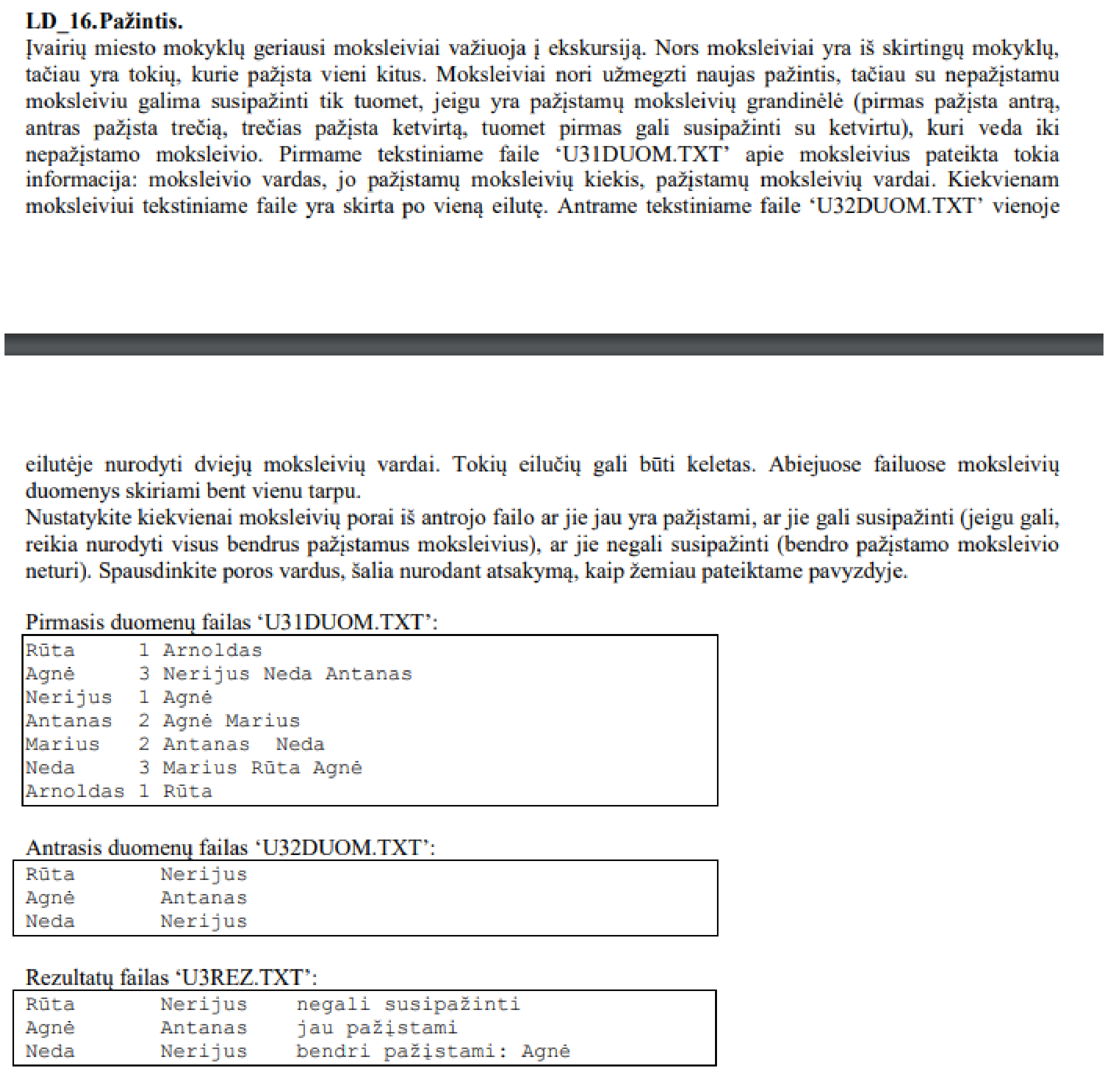
Dėstytojas

**Kaunas 2022**

TURINYS

# 1. Rekursija (L1)

## 1.1. Darbo užduotis



**LD_16.Pažintis.**
Įvairių miesto mokyklų geriausi moksleiviai važiuoja į ekskursiją. Nors moksleiviai yra iš skirtingų mokyklų, tačiau yra tokių, kurie pažįsta vieni kitus. Moksleiviai nori užmegzti naujas pažintis, tačiau su nepažįstamu moksleiviu galima susipažinti tik tuomet, jeigu yra pažįstamų moksleivių grandinėlė (pirmas pažįsta antrą, antras pažįsta trečią, trečias pažįsta ketvirtą, tuomet pirmas gali susipažinti su ketvirtu), kuri veda iki nepažįstamo moksleivio. Pirmame tekstiniame faile 'U31DUOM.TXT' apie moksleivius pateikta tokia informacija: moksleivio vardas, jo pažįstamų moksleivių kiekis, pažįstamų moksleivių vardai. Kiekvienam moksleiviui tekstiniame faile yra skirta po vieną eilutę. Antrame tekstiniame faile 'U32DUOM.TXT' vienoje eilutėje nurodyti dviejų moksleivių vardai. Tokių eilučių gali būti keletas. Abiejuose failuose moksleivių duomenys skiriami bent vienu tarpu.
Nustatykite kiekvienai moksleivių porai iš antrojo failo ar jie jau yra pažįstami, ar jie gali susipažinti (jeigu gali, reikia nurodyti visus bendrus pažįstamus moksleivius), ar jie negali susipažinti (bendro pažįstamo moksleivio neturi). Spausdinkite poros vardus, šalia nurodant atsakymą, kaip žemiau pateiktame pavyzdyje.

Pirmasis duomenų failas 'U31DUOM.TXT':

```
Rūta     1 Arnoldas
Agnė     3 Nerijus Neda Antanas
Nerijus  1 Agnė
Antanas  2 Agnė Marius
Marius   2 Antanas  Neda
Neda     3 Marius Rūta Agnė
Arnoldas 1 Rūta
```

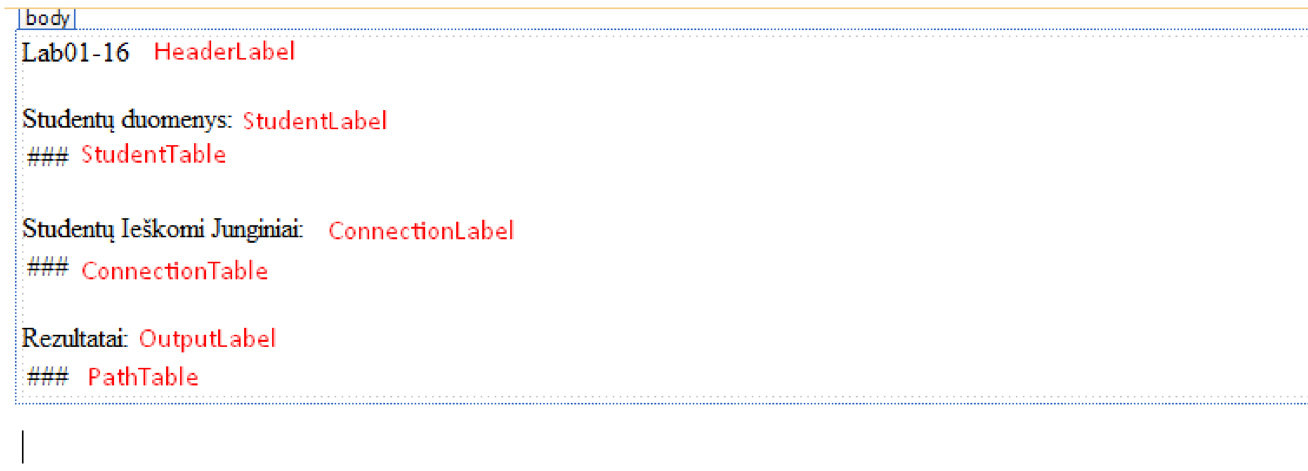
Antrasis duomenų failas 'U32DUOM.TXT':

```
Rūta       Nerijus
Agnė       Antanas
Neda       Nerijus
```

Rezultatų failas 'U3REZ.TXT':

```
Rūta       Nerijus    negali susipažinti
Agnė       Antanas    jau pažįstami
Neda       Nerijus    bendri pažįstami: Agnė
```

## 1.2. Grafinės vartotojo sąsajos schema



body

Lab01-16 HeaderLabel

Studentų duomenys: StudentLabel

### StudentTable

Studentų Ieškomi Junginiai: ConnectionLabel

### ConnectionTable

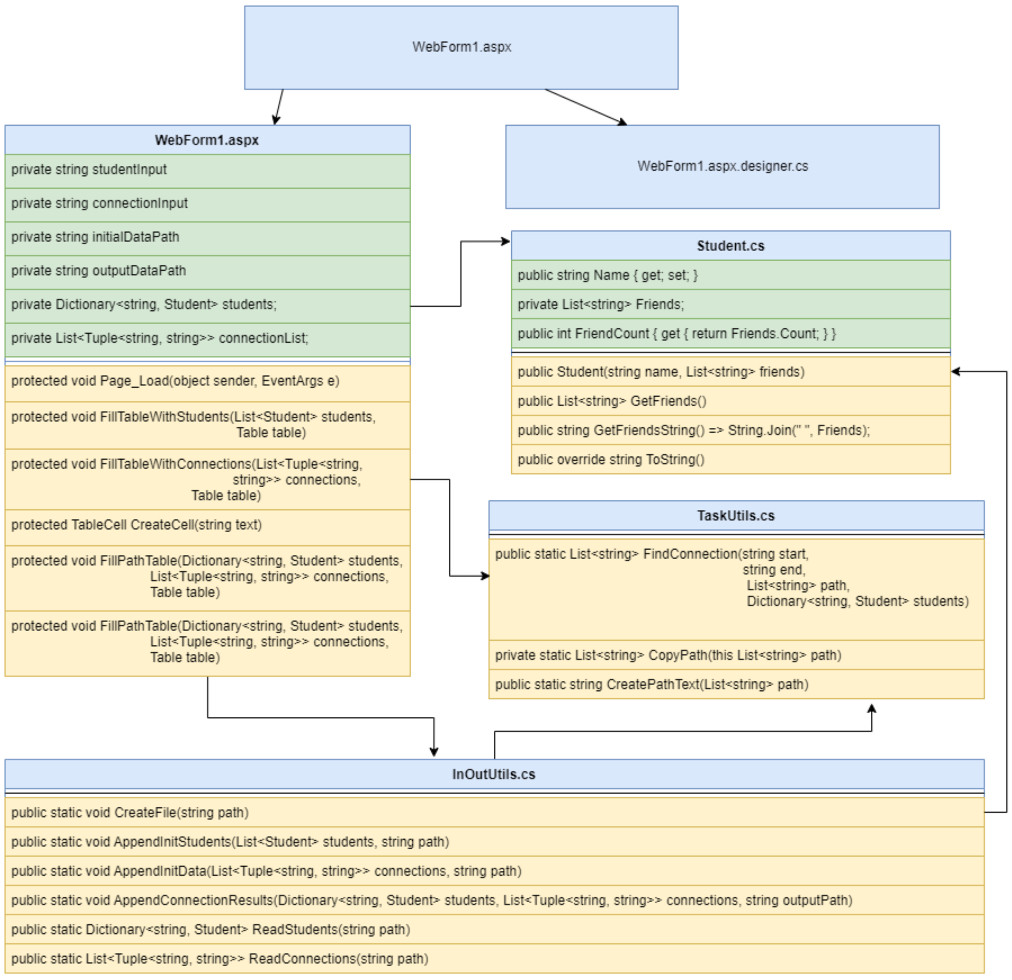
Rezultatai: OutputLabel

### PathTable

## 1.3. Sąsajoje panaudotų komponentų keičiamos savybės

| **Komponentas** | **Savybė** | **Reikšmė** |
|---|---|---|
| HeaderLabel | Text | "Lab01-16" |
| StudentLabel | Text | "Studentų duomenys:" |
| ConnectionLabel | Text | "Studentų Ieškomi Junginiai:" |
| OutputLabel | Text | "Rezultatai:" |

### 1.4. Klasių diagrama


WebForm1.aspx
WebForm1.aspx
private string studentInput
private string connectionInput
private string initialDataPath
private string outputDataPath
private Dictionary<string, Student> students;
private List<Tuple<string, string>> connectionList;
protected void Page_Load(object sender, EventArgs e)
protected void FillTableWithStudents(List<Student> students, Table table)
protected void FillTableWithConnections(List<Tuple<string, string>> connections, Table table)
protected TableCell CreateCell(string text)
protected void FillPathTable(Dictionary<string, Student> students, List<Tuple<string, string>> connections, Table table)
protected void FillPathTable(Dictionary<string, Student> students, List<Tuple<string, string>> connections, Table table)
WebForm1.aspx.designer.cs
Student.cs
public string Name { get; set; }
private List<string> Friends;
public int FriendCount { get { return Friends.Count; } }
public Student(string name, List<string> friends)
public List<string> GetFriends()
public string GetFriendsString() => String.Join(" ", Friends);
public override string ToString()
TaskUtils.cs
public static List<string> FindConnection(string start, string end, List<string> path, Dictionary<string, Student> students)
private static List<string> CopyPath(this List<string> path)
public static string CreatePathText(List<string> path)
InOutUtils.cs
public static void CreateFile(string path)
public static void AppendInitStudents(List<Student> students, string path)
public static void AppendInitData(List<Tuple<string, string>> connections, string path)
public static void AppendConnectionResults(Dictionary<string, Student> students, List<Tuple<string, string>> connections, string outputPath)
public static Dictionary<string, Student> ReadStudents(string path)
public static List<Tuple<string, string>> ReadConnections(string path)

### 1.5. Programos vartotojo vadovas

Atsidarius programą, programa nuskaito App_Data/students.txt ir App_Data/connections.txt. Naudojant tą informaciją, parašo visą informaciją į StudentTable, ConnectionTable, PathTable su duota ir apskaičiuota informacija.

### 1.6. Programos tekstas

InOutUtils.cs:

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
using System.Web;

namespace Lab01
{
    /// <summary>
    /// InOutUtils class for reading and writing data from/to a file
    /// </summary>
    public static class InOutUtils
    {
        /// <summary>
        /// Creates a new empty file, ready for appending data
        /// </summary>
        /// <param name="path">path to the file</param>
        public static void CreateFile(string path)
        {
            using (FileStream fs = new FileStream(path, FileMode.Create))
                new StreamWriter(fs, encoding: System.Text.Encoding.UTF8).Close();
        }


        /// <summary>
        /// appends initial student data to TXT file
        /// </summary>
        /// <param name="students">List of all students (Student object)</param>
        /// <param name="path">path to the file where information will be
appended</param>
        public static void AppendInitStudents(List<Student> students, string path)
        {
            using (StreamWriter sr = new StreamWriter(path, append: true))
            {
                sr.WriteLine("Studentai ir jų draugai");
                sr.WriteLine($"{"Studentas",-20}|{"Draugų kiekis",-20}|{"Draugai:"}");
                foreach (Student student in students)
                    sr.WriteLine(student);
                sr.WriteLine();
            }
        }

        /// <summary>
        /// Appends initial connection data to output file
        /// </summary>
        /// <param name="connections">List of Tuples(string, string) that work as nodes
from student a to student b while using DFS</param>
        /// <param name="path">path to the file where to append initial data</param>
        public static void AppendInitData(List<Tuple<string, string>> connections, string
path)
        {
            using (StreamWriter sr = new StreamWriter(path, append: true))
            {
                sr.WriteLine("Studentai ir jų ieškomi draugai:");
                sr.WriteLine($"{"Studentas",-20} {"Ieškomas draugas",-20}");
                foreach (Tuple<string, string> connection in connections)
                    sr.WriteLine($"{connection.Item1,-20} {connection.Item2,-20}");
                sr.WriteLine();
            }
        }

        /// <summary>
        /// Appends output connection data to output file
        /// </summary>
        /// <param name="students">Dictionary, key -> string, name of the student, value
-> Student class object of the student</param>
        /// <param name="connections">List of tuples(string, string) that is compromised
of student names that work as nodes that are used for DFS</param>
        /// <param name="outputPath">output path to the txt file where data will be
APPENDED</param>
        public static void AppendConnectionResults(Dictionary<string, Student> students,
List<Tuple<string, string>> connections, string outputPath)
        {

            using (StreamWriter sr = new StreamWriter(outputPath))
            {
                sr.WriteLine("Draugai ir jų junginiai, bei keliai:");
                sr.WriteLine($"{"Draugas",-20}|{"Ieškomas draugas:",-20}|{"Kelias:"}");
                foreach (Tuple<string, string> connection in connections)
                {
                    List<string> studentPath = new List<string>();
                    studentPath.Add(connection.Item1);
                    studentPath = TaskUtils.FindConnection(connection.Item1,
connection.Item2, studentPath, students);
                    string pathText = TaskUtils.CreatePathText(studentPath);
                    sr.WriteLine($"{connection.Item1,-20}|{connection.Item2,-
20}|{pathText}");
                }
            }
        }

        /// <summary>
        /// Creates a name to Student class object relation dictionary
        /// </summary>
        /// <param name="path">Path to the the text file containing the data</param>
        /// <returns>Dictionary(key -> string, value -> Student class object) </returns>
        public static Dictionary<string, Student> ReadStudents(string path)
        {
            Dictionary<string, Student> students = new Dictionary<string, Student>();
            using (StreamReader sr = new StreamReader(path))
            {
                string line;
                while ((line = sr.ReadLine()) != null)
                {
                    string[] elements = line.Split(' ');
                    string name = elements[0];
                    List<string> friends = new List<string>();
                    for (int i = 2; i < elements.Length; i++)
                        friends.Add(elements[i]);

                    students.Add(name, new Student(name, friends));
                }
            }
            return students;
        }

        /// <summary>
        /// Gets the connections of students
        /// </summary>
        /// <param name="path">.txt file to the input</param>
        /// <returns>List of Tupples(string, string)</returns>
        public static List<Tuple<string, string>> ReadConnections(string path)
        {
            List<Tuple<string, string>> conncetions = new List<Tuple<string, string>>();
            using (StreamReader sr = new StreamReader(path))
            {
                string line;
                while ((line = sr.ReadLine()) != null)
                {
                    string[] elements = line.Split(' ');
                    conncetions.Add(new Tuple<string, string>(elements[0], elements[1]));
                }
            }

            return conncetions;
        }
    }
}
```

TaskUtils.cs:

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
using System.Web;
```

```
namespace Lab01
{
    /// <summary>
    /// TaskUtils class for extra (backend) computation functions
    /// </summary>
    public static class TaskUtils
    {

        /// <summary>
        /// Recursive implementation of DFS
        /// </summary>
        /// <param name="start">Start of the person</param>
        /// <param name="end">End of the person</param>
        /// <param name="path">path to current position from initial start</param>
        /// <param name="students">Dictionary, key: string (name of the student), value
Student class object</param>
        /// <returns>List of strings, that create a path from student a to b</returns>
        public static List<string> FindConnection(string start, string end, List<string>
path, Dictionary<string, Student> students)
        {
            Student curr = students[start];
            List<string> outputPath = null;
            foreach(string next in curr.GetFriends())
            {
                if (next == end)
                    return path;

                else if (path.Contains(next)) // Checks if the current node has been
visited, so it does not loop
                    continue;

                Student nextStudent = students[next];
                List<string> pathCopy = path.CopyPath();
                pathCopy.Add(next);

                List<String> pathToEnd = FindConnection(next, end, pathCopy, students);
// Recursion Call

                if(outputPath == null || (pathToEnd != null && pathToEnd.Count <
outputPath.Count))
                    outputPath = pathToEnd;

            }

            return outputPath; // Did not found the path
        }

        /// <summary>
        /// Deep copies a string list
        /// </summary>
        /// <param name="path">string list</param>
        /// <returns>string list</returns>
        private static List<string> CopyPath(this List<string> path)
        {
            List<string> copy = new List<string>();
            foreach (string s in path)
                copy.Add(s);

            return copy;
        }

        /// <summary>
        /// Creates connection depending on the path
        /// </summary>
        /// <param name="path"> List of strings that the path is compromised of </param>
        /// <returns>a string form of the path from student a to student b</returns>
        public static string CreatePathText(List<string> path)
        {
            if (path == null)
                return "negali susipažinti";
            else if (path.Count == 1)
                return "jau pažįstami";
            else
            {
                path.RemoveAt(0);
                return $"bendri pažįstami: {String.Join(" ", path)}";
            }
        }


    }
}
```

Student.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab01
{
    /// <summary>
    /// Student Class Data Object that stores the name and connection
    /// </summary>
    public class Student
    {
        public string Name { get; set; }
        private List<string> Friends;
        public int FriendCount { get { return Friends.Count; } }

        /// <summary>
        /// Constructor
        /// </summary>
        public Student(string name, List<string> friends)
        {
            Name = name;
            Friends = new List<string>();
            foreach (string friend in friends)
                Friends.Add(friend);
        }

        /// <summary>
        /// Copies friends
        /// </summary>
        /// <returns>Deep copy of Friends List</returns>
        public List<string> GetFriends()
        {
            List<string> friendList = new List<string>();
            foreach (string friend in Friends)
                friendList.Add(friend);

            return friendList;
        }

        /// <summary>
        /// Transforms Friends list into a string seperated by spaces
        /// </summary>
        /// <returns>string of all friends</returns>
        public string GetFriendsString() => String.Join(" ", Friends);

        /// <summary>
        /// ToString Override
        /// </summary>
        /// <returns>string version of the object: Name, Friend Count, Friends</returns>
        public override string ToString()
        {
            return $"{Name,-20}|{Friends.Count,20}|{GetFriendsString()}";
        }
    }
}
```

WebForm1.aspx:

```
<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="WebForm1.aspx.cs"
Inherits="Lab01.WebForm1" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title></title>
</head>
<body>
    <form id="form1" runat="server">
        <div>
            <asp:Label ID="HeaderLabel" runat="server" Text="Lab01-16"></asp:Label>
            <br />
            <br />
            <asp:Label ID="StudentLabel" runat="server" Text="Studentų
duomenys:"></asp:Label>
            <br />
            <asp:Table ID="StudentTable" runat="server">
            </asp:Table>
            <br />
            <asp:Label ID="ConnectionLabel" runat="server" Text="Studentų Ieškomi
Junginiai:"></asp:Label>
            <br />
            <asp:Table ID="ConnectionTable" runat="server">
            </asp:Table>
            <br />
            <asp:Label ID="OutputLabel" runat="server" Text="Rezultatai:"></asp:Label>
            <br />
            <asp:Table ID="PathTable" runat="server">
            </asp:Table>
        </div>
    </form>
</body>
</html>
```

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;

namespace Lab01
{
    public partial class WebForm1 : System.Web.UI.Page
    {
        private string studentInput = @"App_Data/students.txt";
        private string connectionInput = @"App_Data/connections.txt";
        private string initialDataPath = @"App_Data/initial_data.txt";
        private string outputDataPath = @"App_Data/result.txt";
        private Dictionary<string, Student> students;
        private List<Tuple<string, string>> connectionList;
        protected void Page_Load(object sender, EventArgs e)
        {
            // Initial Data
            InOutUtils.CreateFile(Server.MapPath(initialDataPath));
            students = InOutUtils.ReadStudents(Server.MapPath(studentInput));

            FillTableWithStudents(new List<Student>(students.Values),
                                  StudentTable);

            InOutUtils.AppendInitStudents(new List<Student>(students.Values),
                                          Server.MapPath(initialDataPath));

            connectionList = InOutUtils.ReadConnections(Server.MapPath(connectionInput));

            FillTableWithConnections(connectionList,
                                     ConnectionTable);

            InOutUtils.AppendInitData(connectionList,
                                     Server.MapPath(initialDataPath));


            FillPathTable(students, connectionList, PathTable);
            InOutUtils.CreateFile(Server.MapPath(outputDataPath));

            InOutUtils.AppendConnectionResults(students,
                                              connectionList,
                                              Server.MapPath(outputDataPath));

        }

        /// <summary>
        /// Used to show initial Student Data
        /// </summary>
        /// <param name="students">List Student data type</param>
        /// <param name="table">Table Object data type</param>
        protected void FillTableWithStudents(List<Student> students, Table table)
        {
            TableRow row = new TableRow();
            row.Cells.Add(CreateCell("Studentas"));
            row.Cells.Add(CreateCell("Draugų Kiekis"));
            row.Cells.Add(CreateCell("Studentų Draugai:"));
            table.Rows.Add(row);

            foreach (Student student in students)
            {
                row = new TableRow();
                row.Cells.Add(CreateCell(student.Name));
                row.Cells.Add(CreateCell(student.FriendCount.ToString()));
                row.Cells.Add(CreateCell(student.GetFriendsString()));
                table.Rows.Add(row);

            }
        }

        /// <summary>
        /// Used to show initial connection data
        /// </summary>
        /// <param name="connections">List of Tuples compromised of string, string
containing the initial node and end node to use for DFS</param>
        /// <param name="table">Table object data type</param>
        protected void FillTableWithConnections(List<Tuple<string,
                                                   string>> connections,
                                               Table table)
        {
            TableRow row = new TableRow();
            row.Cells.Add(CreateCell("Draugas"));
            row.Cells.Add(CreateCell("Ieškomas Draugas"));
            table.Rows.Add(row);

            foreach (Tuple<string, string> connection in connections)
            {
                row = new TableRow();
                row.Cells.Add(CreateCell(connection.Item1));
                row.Cells.Add(CreateCell(connection.Item2));
                table.Rows.Add(row);

            }
        }

        /// <summary>
        /// Creates A cell with provided Text
        /// </summary>
        /// <param name="text">text to be added to the Cell.text param</param>
        /// <returns>TableCell object</returns>
        protected TableCell CreateCell(string text)
        {
            TableCell cell = new TableCell();
            cell.Style.Add("padding", "5px");
            cell.Text = text;
            return cell;
        }

        /// <summary>
        /// Fills the table with paths from student a to b
        /// </summary>
        /// <param name="students"> Dictionary, key -> string of the student, value ->
student object</param>
        /// <param name="connections">List of Tuples compromised of string, string
containing the initial node and end node to use for DFS</param>
        /// <param name="table">Table object where the data will be added</param>
        protected void FillPathTable(Dictionary<string, Student> students,
                                     List<Tuple<string, string>> connections,
                                     Table table)
        {
            TableRow row = new TableRow();
            row.Cells.Add(CreateCell("Draugas"));
            row.Cells.Add(CreateCell("Ieškomas Draugas"));
            row.Cells.Add(CreateCell("Kelias: "));
            table.Rows.Add(row);

            foreach (Tuple<string, string> connection in connections)
            {
                List<string> path = new List<string>();
                path.Add(connection.Item1);
                path = TaskUtils.FindConnection(connection.Item1,
                                                connection.Item2,
                                                path, students);

                string pathText = TaskUtils.CreatePathText(path);

                row = new TableRow();
                row.Cells.Add(CreateCell(connection.Item1));
                row.Cells.Add(CreateCell(connection.Item2));
                row.Cells.Add(CreateCell(pathText));
                table.Rows.Add(row);

            }
        }
    }
}
```

## 1.7. Pradiniai duomenys ir rezultatai

```
Pradiniai Duomenys 1:

Tikslas – bendri testavimo duomenys

students.txt:

Rūta 1 Arnoldas
Agnė 3 Nerijus Neda Antanas
Nerijus 1 Agnė
Antanas 2 Agnė Marius
Marius 2 Antanas Neda
Neda 3 Marius Rūta Agnė
Arnoldas 1 Rūta

Tikslas – bendri testavimo duomenys

connections.txt:

Rūta Nerijus
Agnė Antanas
Neda Nerijus

Rezultatai 1:
```

Vartotojo sąsaja:

Lab01-16

Studentų duomenys:

| Studentas | Draugų Kiekis | Studentų Draugai: |
|---|---|---|
| Rūta | 1 | Arnoldas |
| Agnė | 3 | Nerijus Neda Antanas |
| Nerijus | 1 | Agnė |
| Antanas | 2 | Agnė Marius |
| Marius | 2 | Antanas Neda |
| Neda | 3 | Marius Rūta Agnė |
| Arnoldas | 1 | Rūta |

Studentų Ieškomi Junginiai:

| Draugas | Ieškomas Draugas |
|---|---|
| Rūta | Nerijus |
| Agnė | Antanas |
| Neda | Nerijus |

Rezultatai:

| Draugas | Ieškomas Draugas | Kelias: |
|---|---|---|
| Rūta | Nerijus | negali susipažinti |
| Agnė | Antanas | jau pažįstami |
| Neda | Nerijus | bendri pažįstami: Agnė |

```
initial_data.txt:

Studentai ir jų draugai
Studentas           |Draugų kiekis       |Draugai:
Rūta                |                   1|Arnoldas
Agnė                |                   3|Nerijus Neda Antanas
Nerijus             |                   1|Agnė
Antanas             |                   2|Agnė Marius
Marius              |                   2|Antanas Neda
Neda                |                   3|Marius Rūta Agnė
Arnoldas            |                   1|Rūta

Studentai ir jų ieškomi draugai:
Studentas            Ieškomas draugas
Rūta                 Nerijus
Agnė                 Antanas
Neda                 Nerijus

Result.txt:
```

```
Draugai ir jų junginiai, bei keliai:
Draugas             |Ieškomas draugas:   |Kelias:
Rūta                |Nerijus             |negali susipažinti
Agnė                |Antanas             |jau pažįstami
Neda                |Nerijus             |bendri pažįstami: Agnė
```

Pradiniai Duomenys 2:

Tikslas – bendri abstraktūs testavimo duomenys

students.txt:

```
a 2 g b
b 2 a c
c 2 b f
d 1 e
e 1 d
f 2 h c
g 2 a h
h 2 g f
```

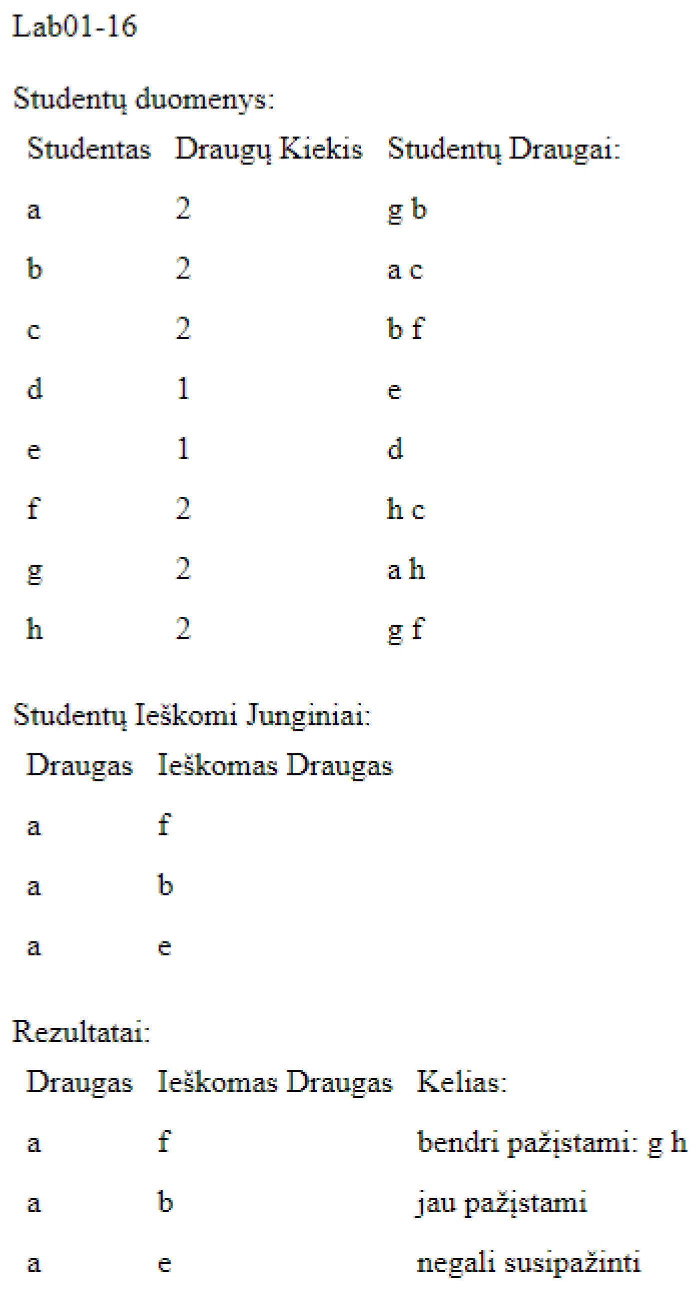
Tikslas – bendri abstraktūs testavimo duomenys

connections.txt:

```
a f
a b
a e
```

```
Rezultatai 2:

Vartotojo Sąsaja:
```



```
Lab01-16

Studentų duomenys:
  Studentas  Draugų Kiekis  Studentų Draugai:
  a          2              g b
  b          2              a c
  c          2              b f
  d          1              e
  e          1              d
  f          2              h c
  g          2              a h
  h          2              g f

Studentų Ieškomi Junginiai:
  Draugas  Ieškomas Draugas
  a        f
  a        b
  a        e

Rezultatai:
  Draugas  Ieškomas Draugas  Kelias:
  a        f                 bendri pažįstami: g h
  a        b                 jau pažįstami
  a        e                 negali susipažinti
```

```
Initial_data.txt:

Studentai ir jų draugai
Studentas           |Draugų kiekis       |Draugai:
a                   |                   2|g b
b                   |                   2|a c
c                   |                   2|b f
d                   |                   1|e
e                   |                   1|d
f                   |                   2|h c
g                   |                   2|a h
h                   |                   2|g f

Studentai ir jų ieškomi draugai:
Studentas            Ieškomas draugas
a                    f
a                    b
a                    e

result.txt:

Draugai ir jų junginiai, bei keliai:
Draugas             |Ieškomas draugas:   |Kelias:
a                   |f                   |bendri pažįstami: g h
a                   |b                   |jau pažįstami
a                   |e                   |negali susipažinti
```

## 1.8. Dėstytojo pastabos

1. Reiktų šiek tiek pakeisti ataskaitos įvardinimą. Jūsų grupė nėra IFF14.

2. Klasių diagramai vien tik Visual Studio įrankio neužtenka. Jis ne neatskleidžia pilnai klasės vidaus.

3. Garmatinės klaidos "su duotą ir apskaičiuotą "

4. • Įvedimo ir išvedimo metodus, veikiančius su tekstiniu failu, talpinkite į public static class InOutUtils.

5. Parametrus reikia komentuoti visiems metodams // /// appends students to TXT file /// public static void AppendInitialStudentData(List students, string path)

6. Čia tik rodyklės perrašymas:

public Student(string name, List friends)

{

Name = name;

Friends = friends;

Laboratorinio įvertinimas: 7 + 1

Testo taškai: 1

Bendras:  9

# 2. Dinaminis atminties valdymas (L2)

## 2.1. Darbo užduotis

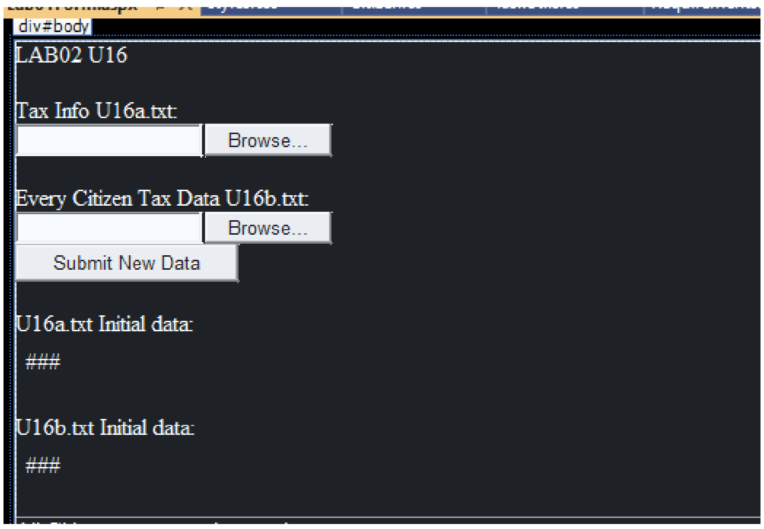
LD_16. **Mokesčiai**. Kiekvieną mėnesį gyventojai moka komunalinius mokesčius. Suraskite, kurį mėnesį ir kokie komunaliniai mokesčiai kainavo pigiausiai. Apskaičiuokite, kokią pinigų sumą komunaliniams mokesčiams išleido visi gyventojai. Sudarykite sąrašą gyventojų (pavardė ir vardas, adresas), kurie už komunalines paslaugas per metus mokėjo sumą, mažesnę už vidutinę. Sąrašas turi būti surikiuotas pagal gyventojų adresus, pavardes ir vardus abėcėlės tvarka.

Duomenys:

- tekstiniame faile `U16a.txt` yra informacija apie komunalines paslaugas: paslaugos kodas, paslaugos pavadinimas, paslaugos vieno mėnesio vieno vieneto kaina;
- tekstiniame faile `U16b.txt` yra informacija apie gyventojus: pavardė ir vardas, adresas, mėnuo už kurį mokama, komunalinės paslaugos kodas, sunaudotų per mėnesį vienetų kiekis.

Pašalinkite iš sąrašo gyventojus, kurie nemokėjo už nurodytą paslaugą, nurodytą mėnesį (duomenys įvedami klaviatūra).

## 2.2. Grafinės vartotojo sąsajos schema



LAB02 U16

Tax Info U16a.txt:

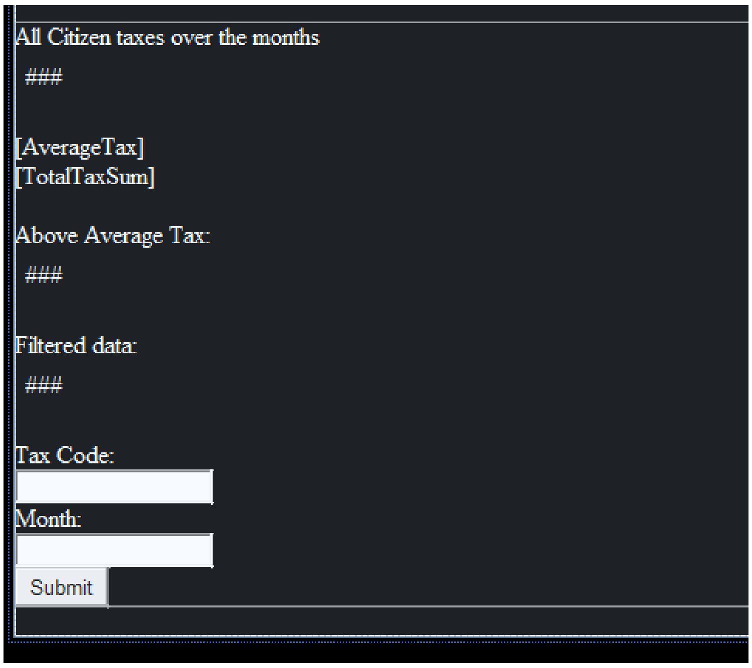
Every Citizen Tax Data U16b.txt:

U16a.txt Initial data:

###

U16b.txt Initial data:

###



All Citizen taxes over the months

###

[AverageTax]
[TotalTaxSum]

Above Average Tax:

###

Filtered data:

###

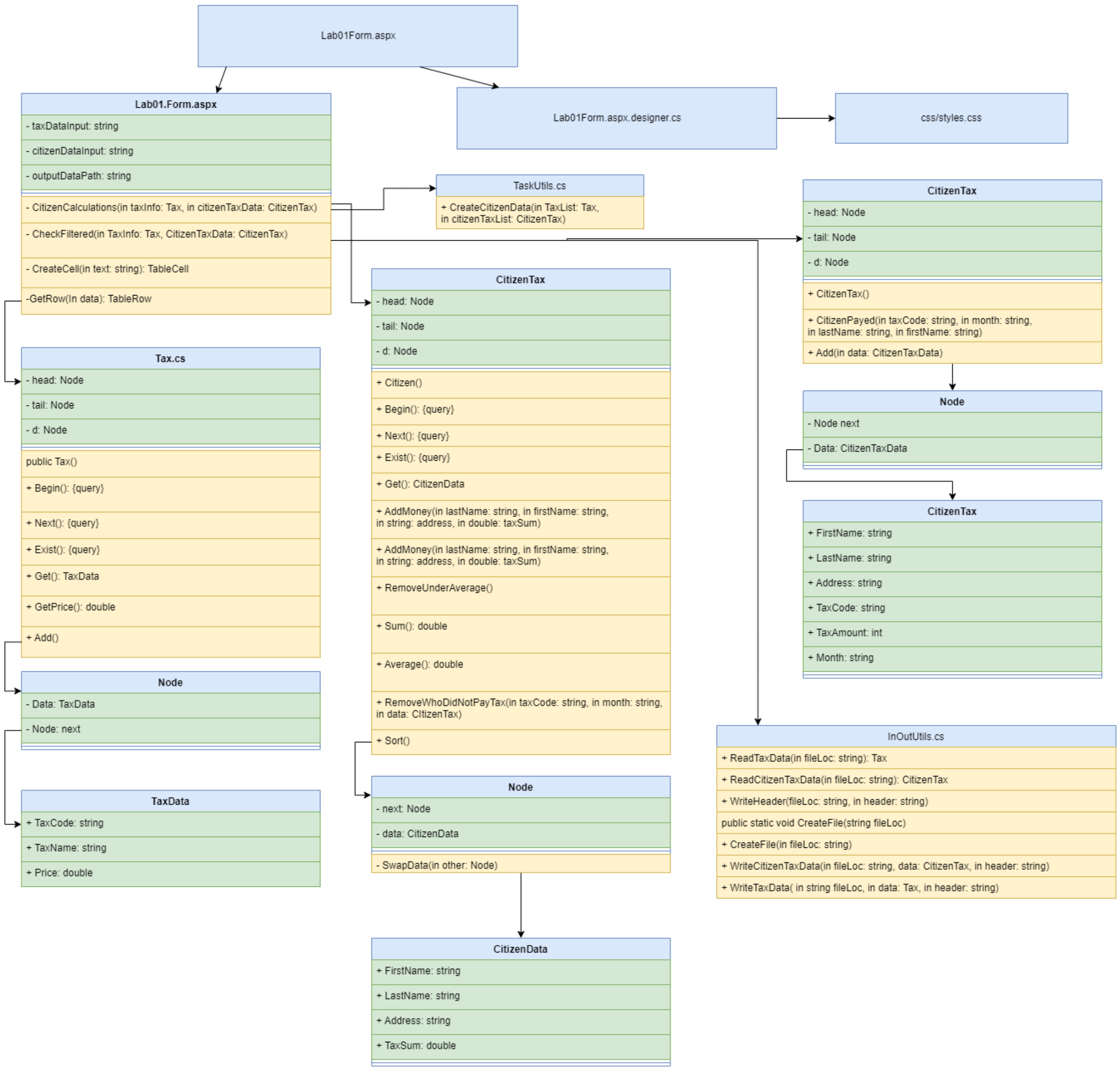
Tax Code:

Month:

## 2.3. Sąsajoje panaudotų komponentų keičiamos savybės

| Komponentas | Savybė | Reikšmė |
|---|---|---|
| HeaderLabel | Text | LAB02 U16 |
| Label1 | Text | Tax InfoU16a.txt: |
| Label2 | Text | Every Citizen Tax Data U16b: |
| InitTaxLabel | Text | U16a.txt Initial data: |
| InitCitizenLabel | Text | U16b.txt Initial data: |
| CitizenTaxLabel | Text | All Citizen taxes over the months |
| AverageTax | Text | “” |
| TotalTaxSum | Text | “” |
| CitizenTaxLabel0 | Text | Above Average Tax: |
| FilterData | Text | Filtered data: |
| ButtonFilter | Text | Tax Code: |
| DataButton | Text | Month: |

## 2.4. Klasių diagrama


Lab01Form.aspx
Lab01.Form.aspx
- taxDataInput: string
- citizenDataInput: string
- outputDataPath: string
- CitizenCalculations(in taxInfo: Tax, in citizenTaxData: CitizenTax)
- CheckFiltered(in TaxInfo: Tax, CitizenTaxData: CitizenTax)
- CreateCell(in text: string): TableCell
-GetRow(In data): TableRow
Lab01Form.aspx.designer.cs
css/styles.css
TaskUtils.cs
+ CreateCitizenData(in TaxList: Tax, in citizenTaxList: CitizenTax)
CitizenTax
- head: Node
- tail: Node
- d: Node
+ CitizenTax()
+ CitizenPayed(in taxCode: string, in month: string, in lastName: string, in firstName: string)
+ Add(in data: CitizenTaxData)
Node
- Node next
- Data: CitizenTaxData
CitizenTax
+ FirstName: string
+ LastName: string
+ Address: string
+ TaxCode: string
+ TaxAmount: int
+ Month: string
Tax.cs
- head: Node
- tail: Node
- d: Node
public Tax()
+ Begin(): {query}
+ Next(): {query}
+ Exist(): {query}
+ Get(): TaxData
+ GetPrice(): double
+ Add()
Node
- Data: TaxData
- Node: next
TaxData
+ TaxCode: string
+ TaxName: string
+ Price: double
CitizenTax
- head: Node
- tail: Node
- d: Node
+ Citizen()
+ Begin(): {query}
+ Next(): {query}
+ Exist(): {query}
+ Get(): CitizenData
+ AddMoney(in lastName: string, in firstName: string, in string: address, in double: taxSum)
+ AddMoney(in lastName: string, in firstName: string, in string: address, in double: taxSum)
+ RemoveUnderAverage()
+ Sum(): double
+ Average(): double
+ RemoveWhoDidNotPayTax(in taxCode: string, in month: string, in data: CItizenTax)
+ Sort()
Node
- next: Node
- data: CitizenData
- SwapData(in other: Node)
CitizenData
+ FirstName: string
+ LastName: string
+ Address: string
+ TaxSum: double
InOutUtils.cs
+ ReadTaxData(in fileLoc: string): Tax
+ ReadCitizenTaxData(in fileLoc: string): CitizenTax
+ WriteHeader(fileLoc: string, in header: string)
public static void CreateFile(string fileLoc)
+ CreateFile(in fileLoc: string)
+ WriteCitizenTaxData(in fileLoc: string, data: CitizenTax, in header: string)
+ WriteTaxData( in string fileLoc, in data: Tax, in header: string)

## 2.5. Programos vartotojo vadovas

Jeigu neranda failų visų duombazėje, programa paprašo failų. Jeigu randa tik vieną pradinį failą, rodo tik jį ir prašo likusių failų. Kai abu failai atsiranda duombazėje, užkrauna skaičiavimus. Apskaičiuoja vidutinę mokesčių kainą, sumą visų ir individualių žmonių. Tekstas yra rikiuojamas A-Z pagal: adresą, pavardę, vardą. Kodas leidžia filtruoti žmones, kurie mokėjo nurodytą mėnesį (mėnuo yra string) už nurodytus mokesčius naudojant „Tax Code“ (string). Prie filtered lentelės prideda tik filtruotus duomenis.

## 2.6. Programos tekstas

`CitizenData.cs:`

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI.WebControls;

namespace Lab02
{
    /// <summary>
    /// TaskUtils static class for helper functions
    /// </summary>
    public static class TaskUtils
    {

        /// <summary>
        /// Creates Citizen class object using Tax object
        /// </summary>
        /// <param name="TaxList">Tax class object</param>
        /// <param name="citizenTaxList">CitizenTax object</param>
        /// <returns>Citizen class object</returns>
        public static Citizen CreateCitizenData(Tax TaxList, CitizenTax citizenTaxList)
        {
            Citizen citizens = new Citizen();
            for (citizenTaxList.Begin(); citizenTaxList.Exist(); citizenTaxList.Next())
            {
                CitizenTaxData citizenTaxData = citizenTaxList.Get();
                for (TaxList.Begin(); TaxList.Exist(); TaxList.Next())
                {
                    TaxData taxData = TaxList.Get();
                    if(citizenTaxData.TaxCode == taxData.TaxCode)
                    {
                        citizens.AddMoney(citizenTaxData.LastName,
citizenTaxData.FirstName, citizenTaxData.Address, (double)taxData.Price *
citizenTaxData.TaxAmount);

                    }
                }
            }

            return citizens;
        }


    }
}
```

Citizen.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI.WebControls;

namespace Lab02
{
    /// <summary>
    /// Citizen class object
    /// </summary>
    public class Citizen
    {
        private Node head;
        private Node tail;
        private Node d;

        /// <summary>
        /// Construcotr
        /// </summary>
        /// <param name="head"></param>
        /// <param name="tail"></param>
        public Citizen()
        {
            head = null;
            tail = null;
        }



        /** Address of the head of the list is assigned */
        public void Begin()
        { d = head; }
        /** Interface variable gets address of the next entry*/
        public void Next()
        { d = d.next; }
        /** Return true, if list is empty*/
        public bool Exist()
        { return d != null; }
        //-----------------------------------------------
        /** Return data according to the interface address*/
        public CitizenData Get()
        { return d.Data; }


        /// <summary>
        /// Returns Citizen with keys
        /// </summary>
        /// <param name="lastName">Last Name of Citizen</param>
        /// <param name="firstName">First Name of Citizen</param>
        /// <param name="address">Address of citizen</param>
        /// <returns></returns>
        public CitizenData Get(string lastName, string firstName, string address)
        {
            // If Citizen exists, adds sum to his current balance
            for (Begin(); Exist(); Next())
            {
                CitizenData curr = Get();
                if (curr.LastName == lastName && curr.FirstName == firstName && curr.Address
== address)
                {
                    return curr;
                }
            }
            return null;
        }

        /// <summary>
        /// Adds CitizenData to Citizen Linked List
        /// </summary>
        /// <param name="data">CitizenData object</param>
        internal void Add(CitizenData data)
        {
            // If No citizen was found, adds the citizen to Linked List
            if (head == null)
            {
                head = new Node(data, null);
                tail = head;
            }
            else
            {
                tail.next = new Node(data, null);
                tail = tail.next;
            }
        }
```

```
/// <summary>
/// Removes citiznens from linked list who payed belove average taxes
/// </summary>
public void RemoveUnderAverage()
{
    if (head == null)
        return;

    Node prev = head;
    Node curr = head.next;
    double average = GetAverage();

    while(curr != null)
    {
        if(curr.Data.TaxSum < average)
        {
            prev.next = curr.next;
            curr = curr.next;
        }
        else
        {
            curr = curr.next;
            prev = prev.next;
        }
    }

    RemoveUnderAverageHead(average);
    ResetTail();
}

/// <summary>
/// Checks if head/start of linked list is below average. If true removes
/// </summary>
/// <param name="average">Average tax sum of a citizen</param>
private void RemoveUnderAverageHead(double average)
{
    Node curr = head;
    while(curr.Data.TaxSum < average)
    {
        curr = curr.next;
    }
    head = curr;
}

/// <summary>
/// Resets tail after removing elements
/// </summary>
private void ResetTail()
{
    Node curr = head;
    if (curr == null)
    {
        tail = null;
        return;
    }

    while(curr.next != null)
    {
        curr = curr.next;
    }
    tail = curr;
}

/// <summary>
/// Returns the total amount citizens payed for taxes
```

```
        /// </summary>
        /// <returns></returns>
        public double Sum()
        {
            Node curr = head;
            double sum = 0;
            while (curr != null)
            {
                sum += curr.Data.TaxSum;
                curr = curr.next;
            }
            return sum;
        }

        public double GetAverage()
        {
            Node curr = head;
            double sum = 0;
            int i = 0;
            while (curr != null)
            {
                sum += curr.Data.TaxSum;
                i++;
                curr = curr.next;
            }

            if (i == 0)
                return 0;
            else
                return (double)sum / i;
        }

        /// <summary>
        /// Removes citizens who did not pay taxes specified month
        /// </summary>
        /// <param name="taxCode"> Tax Code of the tax</param>
        /// <param name="month">Specified Month </param>
        /// <param name="data">CitizenTaxData to see what citizen payed what tax at the
specified month</param>
        public void RemoveWhoDidNotPayTax(string taxCode, string month, CitizenTax data)
        {
            {
                if (head == null)
                    return;

                Node prev = head;
                Node curr = head.next;

                while (curr != null)
                {
                    // Checks if the citizen has payed Taxes in CitizenTaxData on specified
Month
                    if (curr != null && data.CitizenPayed(taxCode, month, curr.Data.LastName,
curr.Data.FirstName) == false)
                    {
                        prev.next = curr.next;
                        curr = curr.next;
                    }
                    else
                    {
                        curr = curr.next;
                        prev = prev.next;
                    }
                }

                RemoveWhoDidNotPayTaxHead(taxCode, month, data);
                ResetTail();
            }
        }

        /// <summary>
        /// Checks first/start/head element of the linked list if the tax was paid
        /// </summary>
        /// <param name="taxCode">Tax code of the specified tax</param>
        /// <param name="month">specified month to check</param>
        /// <param name="data">CitizenTaxData to check if the first element of the linked list
payed for taxes</param>
        private void RemoveWhoDidNotPayTaxHead(string taxCode, string month, CitizenTax data)
        {
            Node curr = head;
            // Checks if the citizen has payed Taxes in CitizenTaxData on specified Month
            while (curr != null && data.CitizenPayed(taxCode, month, curr.Data.LastName,
curr.Data.FirstName) == false)
            {
                curr = curr.next;
            }
            head = curr;
        }


        /// <summary>
        /// Sorts LinkedList A-Z using keys: address, last name, first name. Does data swap
instead of pointers.
        /// </summary>
        public void Sort()
        {
            Node timer = head;
            while(timer != null)
            {
                Node curr = head;
                Node next = head.next;
                while(next != null)
                {
                    if (curr.Data.CompareTo(next.Data) > 0)
                    {
                        curr.SwapData(next);
                    }
                    curr = next;
                    next = next.next;
                }
                timer = timer.next;
            }
        }


        /// <summary>
        /// Node class to be used to save every citizen seperately
        /// </summary>
        class Node
        {
            public CitizenData Data { get; set; }
            public Node next { get; set; }

            /// <summary>
            /// Constructor
            /// </summary>
            /// <param name="data">CitizenData pointer</param>
            public Node(CitizenData data, Node _next)
            {
                Data = data;
                next = _next;
            }
            /// <summary>
            /// Swaps the DATA, keeps the pointers
            /// </summary>
            /// <param name="other">Other node to be swapped with</param>
            public void SwapData(Node other)
            {
                CitizenData temp = Data;
                Data = other.Data;
                other.Data = temp;
            }
        }
    }
}
```

CitizenTaxData.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab02
{
    public class CitizenTaxData
    {

        public string FirstName { get; set; }
        public string LastName { get; set; }
        public string Address { get; set; }
        public string TaxCode { get; set; }
        public int TaxAmount { get; set; }
        public string Month { get; set; }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="lastName">last name of citizen</param>
        /// <param name="firstName">first name of citizen</param>
        /// <param name="address">address of the citizen</param>
        /// <param name="month">the month the tax was paid</param>
        /// <param name="taxCode">tax code</param>
        /// <param name="taxAmount">tax amount</param>
        public CitizenTaxData(string lastName, string firstName, string address, string
month, string taxCode, int taxAmount)
        {
            FirstName = firstName;
            LastName = lastName;
            Address = address;
            TaxCode = taxCode;
            TaxAmount = taxAmount;
            Month = month;
        }

        public override string ToString()
        {
            return $"{LastName,-20} {FirstName,-20}|{Address,-20}|{Month,-15}|{TaxCode,-
20}|{TaxAmount,10}|";
        }
    }
}
```

CitizenTax.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI.WebControls;

namespace Lab02
{
    /// <summary>
    /// Citizen class object meant to store name and how much the individual payed for taxe
    /// </summary>
    public class CitizenTax
    {
        private Node head;
        private Node tail;
        private Node d;

        /// <summary>
        /// Constructor
        /// </summary>
        public CitizenTax()
        {
            head = null;
            tail = null;
        }
        /// <summary>
        /// Adds element to Linked List
        /// </summary>
        /// <param name="lastName">Last Name</param>
        /// <param name="firstName">First Name</param>
        /// <param name="address">Address</param>
        /// <param name="month">Month</param>
        /// <param name="taxCode">Tax Code</param>
        /// <param name="taxAmount">Tax Amount</param>
        public void Add(CitizenTaxData data)
        {
            if (head == null)
            {
                head = new Node(data, null);
                tail = head;

            }
            else
            {
                tail.next = new Node(data, null);
                tail = tail.next;
            }

        }

        /** Address of the head of the list is assigned */
        public void Begin()
        { d = head; }
        /** Interface variable gets address of the next entry*/
        public void Next()
        { d = d.next; }
        /** Return true, if list is empty*/
        public bool Exist()
        { return d != null; }
        //-----------------------------------------------
        /** Return data according to the interface address*/
        public CitizenTaxData Get()
        { return d.Data; }

        /// <summary>
        /// Checks of the specified citizen has payed
        /// </summary>
        /// <param name="taxCode">Tax Code of the Tax Company</param>
        /// <param name="month">Month</param>
        /// <param name="lastName">Last name of the citizen</param>
        /// <param name="firstName"> First Name of the citizen</param>
        /// <returns>true if citizen has payed for specified tax on specified month, false if
the citizen did not</returns>
        public bool CitizenPayed(string taxCode, string month, string lastName, string
firstName)
        {
            Node curr = head;
            while (curr != null)
            {
                if (curr.Data.LastName == lastName && curr.Data.FirstName == firstName &&
curr.Data.Month == month && curr.Data.TaxCode == taxCode)
                    return true; // The Person paid for the month

                curr = curr.next;
            }
            return false;
        }

        /// <summary>
        /// Node class object for CitizenTaxData
        /// </summary>
        class Node
        {
            public Node next;
            public CitizenTaxData Data { get; set; }

            /// <summary>
            /// Constructor
            /// </summary>
            /// <param name="data">Pointer to CitizenTaxData object</param>
            public Node(CitizenTaxData data, Node _next)
            {
                Data = data;
                next = _next;
            }
        }
    }
}
```

TaxData.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab02
{
    /// <summary>
    /// TaxData object to be inherited by Tax object
    /// </summary>
    public class TaxData
    {
        public string TaxCode { get; set; }
        public string TaxName { get; set; }
        public double Price { get; set; }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="taxCode"></param>
        /// <param name="taxName"></param>
        /// <param name="price"></param>
        public TaxData(string taxCode, string taxName, double price)
        {
            TaxCode = taxCode;
            TaxName = taxName;
            Price = price;
        }

        /// <summary>
        /// Returns Node in string format
        /// </summary>
        /// <returns>Node in string format</returns>
        public override string ToString()
        {
            return $"{TaxCode,-20}|{TaxName,-20}|{Price,10:f}|";
        }
    }
}
```

Tax.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI.WebControls;

namespace Lab02
{
    public class Tax
    {
        private Node head;
        private Node tail;
        private Node d;
        public Tax()
        {
            head = null;
            tail = null;
        }

        /** Address of the head of the list is assigned */
        public void Begin()
        { d = head; }
        /** Interface variable gets address of the next entry*/
        public void Next()
        { d = d.next; }
        /** Return true, if list is empty*/
        public bool Exist()
        { return d != null; }
        //-----------------------------------------------
        /** Return data according to the interface address*/
        public TaxData Get()
        { return d.Data; }

        /// <summary>
        /// Returns the price of the tax of a single use
        /// </summary>
        /// <param name="taxCode">Code to identify the type of tax</param>
        /// <returns>Double, price of a single use tax item</returns>
        public double GetPrice(string taxCode)
        {
            Node curr = head;
            while (curr != null)
            {
                if (curr.Data.TaxCode == taxCode)
                    return curr.Data.Price;
                curr = curr.next;
            }
            return 0;
        }

        /// <summary>
        /// Adds Node to the tail of the LinkedList
        /// </summary>
        /// <param name="taxCode">Code of the tax</param>
        /// <param name="name"> name of the company</param>
        /// <param name="price">price of a single use</param>
        public void Add(TaxData data)
        {
            if (head == null)
            {
                head = new Node(data, null);
                tail = head;
            }
            else
            {
                tail.next = new Node(data, null);
                tail = tail.next;
            }

        }

        /// <summary>
        /// Tax Node
        /// </summary>
        class Node
        {
            public Node next;
            public TaxData Data { get; set; }
            /// <summary>
            /// Constructor
            /// </summary>
            /// <param name="data">TaxData pointer</param>
            public Node(TaxData data, Node _next)
            {
                Data = data;
                next = _next;
            }

        }
    }
}
```

InOutUtils.cs:

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
using System.Web;

namespace Lab02
{
    /// <summary>
    /// Static InOutUtils helper class for Input/Output with files
    /// </summary>
    public static class InOutUtils
    {
        /// <summary>
        /// Reads Tax Data from txt to Tax class object+
        /// </summary>
        /// <param name="fileLoc">Location of the data in .txt format</param>
        /// <returns>Tax class object</returns>
        public static Tax ReadTaxData(string fileLoc)
        {
            Tax taxes = new Tax();
            string[] lines = File.ReadAllLines(fileLoc);
            foreach (string line in lines)
            {
                string[] elements = line.Split(';');
                taxes.Add(new TaxData(elements[0], elements[1],
double.Parse(elements[2])));
            }
            return taxes;
        }

        /// <summary>
        /// Creates CitizenTaxData from .txt file
        /// </summary>
        /// <param name="fileLoc">Location of .txt file</param>
        /// <returns>CitizenTaxData class object</returns>
        public static CitizenTax ReadCitizenTaxData(string fileLoc)
        {
            CitizenTax data = new CitizenTax();
            string[] lines = File.ReadAllLines(fileLoc);
            foreach (string line in lines)
            {
                string[] elements = line.Split(';');
                CitizenTaxData temp = new CitizenTaxData(elements[1], elements[0],
elements[2], elements[3], elements[4], int.Parse(elements[5]));
                data.Add(temp);
            }
            return data;
        }

        /// <summary>
        /// Appends a header to a file
        /// </summary>
        /// <param name="fileLoc">Name/location of the file</param>
        /// <param name="header">text to be appended</param>
        public static void WriteHeader(string fileLoc, string header)
        {
            using (StreamWriter writer = new StreamWriter(fileLoc, append: true))
            {
                writer.WriteLine(header);
                writer.WriteLine();
            }
        }

        /// <summary>
        /// Creates a new or wipes a file
        /// </summary>
        /// <param name="fileLoc">Location of the file</param>
        public static void CreateFile(string fileLoc)
        {
            using (FileStream fs = new FileStream(fileLoc, FileMode.Create))
                new StreamWriter(fs, encoding: System.Text.Encoding.UTF8).Close();
        }

        /// <summary>
        /// Appends CitizenTaxData to a file
        /// </summary>
        /// <param name="fileLoc">Location/name of the file</param>
        /// <param name="data">data to append to the .txt file</param>
        /// <param name="header">Header text of the data file</param>
        public static void WriteCitizenTaxData(string fileLoc, CitizenTax data, string
header)
        {
            using (StreamWriter writer = new StreamWriter(fileLoc, append:true))
            {
                writer.WriteLine(header);
                writer.WriteLine();
                writer.WriteLine($"{"LastName",-20} {"FirstName",-20}|{"Address",-
20}|{"Month",-15}|{"TaxCode",-20}|{"TaxAmount",10}|");
                for (data.Begin(); data.Exist(); data.Next())
                {
                    CitizenTaxData temp = data.Get();
                    writer.WriteLine(temp.ToString());
                }
                writer.WriteLine();
            }
        }

        /// <summary>
        /// appends Citizen class object data to text file
        /// </summary>
        /// <param name="fileLoc">location/name of the file</param>
        /// <param name="data">data to append to the file</param>
        /// <param name="header">Header of the file</param>
        public static void WriteCitizenData(string fileLoc, Citizen data, string header)
        {
            using (StreamWriter writer = new StreamWriter(fileLoc, append: true))
            {
                writer.WriteLine(header);
                writer.WriteLine();
                writer.WriteLine($"{"LastName",-20} {"FirstName",-20}|{"Address",-
20}|{"TaxSum",-10}|");
                for (data.Begin(); data.Exist(); data.Next())
                {
                    CitizenData temp = data.Get();
                    writer.WriteLine(temp.ToString());
                }
                writer.WriteLine();
            }
        }

        /// <summary>
        /// Appends Tax data to a .txt file
        /// </summary>
        /// <param name="fileLoc">Location/name of the file</param>
        /// <param name="data">data to append to the .txt file</param>
        /// <param name="header">header to be added to the file</param>
        public static void WriteTaxData(string fileLoc, Tax data, string header)
        {
            using (StreamWriter writer = new StreamWriter(fileLoc, append: true))
            {
                writer.WriteLine(header);
                writer.WriteLine();
                writer.WriteLine($"{"TaxCode",-20}|{"TaxName",-20}|{"Price",10:2f}|");
                for (data.Begin(); data.Exist(); data.Next())
                {
                    TaxData temp = data.Get();
                    writer.WriteLine(temp.ToString());
                }
                writer.WriteLine();
            }
        }
    }
}
```

css/styles.css:

```
body {
    color:white;
    background:black;
}
td
{
    padding:5px;
}

Lab01Form.aspx:

<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="Lab01Form.aspx.cs"
Inherits="Lab02.Lab01Form" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <link rel="stylesheet" runat="server" media="screen" href="~/css/styles.css" />
    <title>Lab02 U16</title>
</head>
<body>
    <form id="form1" runat="server">
        <div id="body">
            <asp:Label ID="HeaderLabel" runat="server" Text="LAB02 U16"></asp:Label>
            <br />
            <br />
            <asp:Label ID="Label1" runat="server" Text="Tax Info U16a.txt:"></asp:Label>
            <br />
            <asp:FileUpload ID="FileUpload1" runat="server" />
            <br />
            <br />
            <asp:Label ID="Label2" runat="server" Text="Every Citizen Tax Data U16b.txt:
"></asp:Label>
            <br />
            <asp:FileUpload ID="FileUpload2" runat="server" />
            <br />
            <asp:Button ID="DataButton" runat="server" Text="Submit New Data"
OnClick="DataButton_Click" />
            <br />
            <br />
            <asp:Label ID="InitTaxLabel" runat="server" Text="U16a.txt Initial
data:"></asp:Label>
            <asp:Table ID="InitTaxTable" runat="server">
            </asp:Table>
            <br />
            <asp:Label ID="InitCitizenLabel" runat="server" Text="U16b.txt Initial
data:"></asp:Label>
            <asp:Table ID="InitCitizenTable" runat="server">
            </asp:Table>
            <br />
            <asp:Panel ID="CalculationsPanel" runat="server">
                <asp:Label ID="CitizenTaxLabel" runat="server" Text="All Citizen taxes
over the months"></asp:Label>
                <asp:Table ID="CitizenTaxTable" runat="server">
                </asp:Table>
                <br />
                <asp:Label ID="AverageTax" runat="server"></asp:Label>
                <br />
                <asp:Label ID="TotalTaxSum" runat="server"></asp:Label>
                <br />
                <br />
                <asp:Label ID="CitizenTaxLabel0" runat="server" Text="Above Average
Tax:"></asp:Label>
                <asp:Table ID="AboveAverageTable" runat="server">
                </asp:Table>
                <br />
                <asp:Label ID="FilterData" runat="server" Text="Filtered
data:"></asp:Label>
                <asp:Table ID="FilterTable" runat="server">
                </asp:Table>
                <br />
                Tax Code:<br />
                <asp:TextBox ID="TaxCodeTextBox" runat="server"></asp:TextBox>
                <br />
                Month:<br />
                <asp:TextBox ID="TaxMonthTextBox" runat="server"></asp:TextBox>
                <br />
                <asp:Button ID="ButtonFilter" runat="server" Text="Submit"
OnClick="ButtonFilter_Click" />
            </asp:Panel>
            <br />
        </div>
    </form>
</body>
</html>
```

```
Lab01Form.aspx.cs:

using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;

namespace Lab02
{
    public partial class Lab01Form : System.Web.UI.Page
    {
        private string taxDataInput = @"App_Data/U16a.txt";
        private string citizenDataInput = @"App_Data/U16b.txt";
        private string outputDataPath = @"App_Data/U16result.txt";
        protected void Page_Load(object sender, EventArgs e)
        {
            CitizenTax citizenTaxData = null;
            Tax taxInfo = null;
            InOutUtils.CreateFile(Server.MapPath(outputDataPath));
            if (File.Exists(Server.MapPath(taxDataInput)))
            {
                taxInfo = InOutUtils.ReadTaxData(Server.MapPath(taxDataInput));
                InOutUtils.WriteTaxData(Server.MapPath(outputDataPath), taxInfo, "Initial
Tax Company Data:");
                FillTaxDataTable(taxInfo, InitTaxTable);
            }
            else
            {
                InitTaxLabel.Text = "";
            }

            if (File.Exists(Server.MapPath(citizenDataInput)))
            {
                citizenTaxData =
InOutUtils.ReadCitizenTaxData(Server.MapPath(citizenDataInput));
                InOutUtils.WriteCitizenTaxData(Server.MapPath(outputDataPath),
citizenTaxData, "Initial Citizen Tax Data:");
                FillCitizenTaxDataTable(citizenTaxData, InitCitizenTable);
            }
            else
            {
                InitCitizenLabel.Text = "";
            }

            if (citizenTaxData != null && taxInfo != null)
            {
                // Reads Initial Data and Outputs the Initial Data To WebForm and to text


                CitizenCalculations(taxInfo, citizenTaxData);
                CheckFiltered(taxInfo, citizenTaxData);
            }
            else
            {
                HeaderLabel.Text = "Plaese Upload remaining data files";
                CalculationsPanel.Visible = false;
            }
        }

        /// <summary>
        /// Does calculations from Tax and CitizenTax object
        /// </summary>
        /// <param name="taxInfo">Tax object</param>
        /// <param name="citizenTaxData">CitizenTax object</param>
        protected void CitizenCalculations(Tax taxInfo, CitizenTax citizenTaxData)
        {
            Citizen citizensAverage = TaskUtils.CreateCitizenData(taxInfo,
citizenTaxData); // For Above Average
            InOutUtils.WriteCitizenData(Server.MapPath(outputDataPath), citizensAverage,
"Tax Sum of all citizens:");

            citizensAverage.Sort();
            InOutUtils.WriteCitizenData(Server.MapPath(outputDataPath), citizensAverage,
"Tax Sum of all citizens SORTED A-Z:");
            FillCitizenTable(citizensAverage, CitizenTaxTable);

            double sum = citizensAverage.Sum();
            double average = citizensAverage.GetAverage();
            InOutUtils.WriteHeader(Server.MapPath(outputDataPath), $"All Citizen TOTAL
Tax Sum: {sum:f}");
            InOutUtils.WriteHeader(Server.MapPath(outputDataPath), $"Average Tax Sum:
{average:f}");
            AverageTax.Text = $"Average tax per citizen: {average}";
            TotalTaxSum.Text = $"Total tax sum: {sum}";

            citizensAverage.RemoveUnderAverage();
            InOutUtils.WriteCitizenData(Server.MapPath(outputDataPath), citizensAverage,
"Citizens who paid above average:");
            FillCitizenTable(citizensAverage, AboveAverageTable);
        }
        /// <summary>
        /// Updates filtered data
        /// </summary>
        /// <param name="taxInfo">Tax Object</param>
        /// <param name="citizenTaxData">CitizenTax object</param>
        protected void CheckFiltered(Tax taxInfo, CitizenTax citizenTaxData)
        {
            if (Session["TaxCode"] != null && Session["Month"] != null)
            {
                Citizen citizensFiltered = TaskUtils.CreateCitizenData(taxInfo,
citizenTaxData); // For Filter
                citizensFiltered.Sort();
                citizensFiltered.RemoveWhoDidNotPayTax(Session["TaxCode"].ToString(),
Session["Month"].ToString(), citizenTaxData);
                InOutUtils.WriteCitizenData(Server.MapPath(outputDataPath),
citizensFiltered, $"Citizens who paid TaxCode: \"{Session["TaxCode"]}\" on Month:
\"{Session["Month"]}\"");
                FillCitizenTable(citizensFiltered, FilterTable);
            }
            else
            {
                FilterData.Text = "No Filter provided";
            }

            Session["TaxCode"] = null;
            Session["Month"] = null;
        }
```

## 2.7. Pradiniai duomenys ir rezultatai

```
U16a.txt:

11; Elektra; 0.12
21; Dujos; 0.58
31; Benzinas; 1.78
32; Diezelis; 1.90

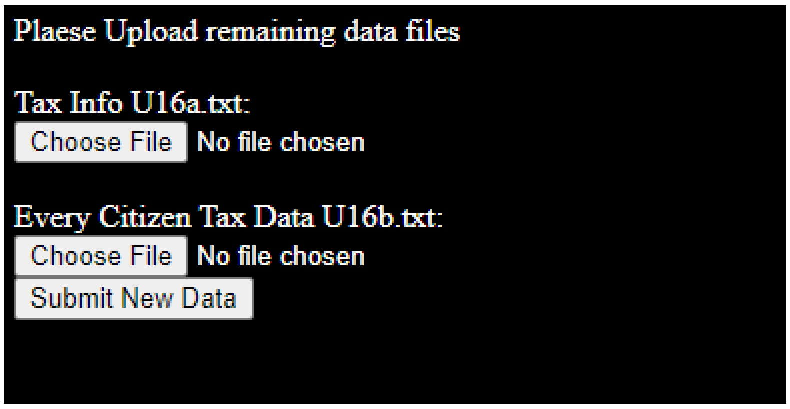
U16b.txt:

pavardė1; vardas1; adresas1;1;22;28;
pavardė1; vardas1; adresas1;5;22;20;
pavardė1; vardas1; adresas1;1;32;100;
pavardė1; vardas1; adresas1;2;32;97;
pavardė1; vardas1; adresas1;3;32;63;
pavardė1; vardas1; adresas1;2;22;25;
pavardė1; vardas1; adresas1;3;22;29;
pavardėAA; vardasAA; adresasAA;1;21;13;
pavardėAA; vardasAA; adresasAA;2;21;84;
pavardėAA; vardasAA; adresasAA;3;21;76;
pavardė1; vardas1; adresas1;4;22;39;
pavardė2; vardas2; adresas2;3;31;67;
pavardė2; vardas2; adresas2;4;31;98;
pavardė0; vardas2; adresas2;5;31;125;
pavardė0; vardas0; adresas3;1;11;31;
pavardė1; vardas1; adresas1;4;32;39;
pavardė1; vardas1; adresas1;5;32;20;
pavardė1; vardas1; adresas1;3;11;80;
pavardė1; vardas1; adresas1;4;11;39;
pavardė1; vardas1; adresas1;1;11;120;
pavardė1; vardas1; adresas1;2;11;100;
pavardė1; vardas1; adresas1;5;11;139;
pavardė2; vardas2; adresas2;1;31;31;
pavardė2; vardas2; adresas2;2;31;48;
pavardė0; vardas0; adresas3;2;11;48;
pavardė0; vardas0; adresas3;3;11;67;
pavardė0; vardas0; adresas3;4;11;98;
pavardė0; vardas0; adresas3;5;11;125;
pavardėAA; vardasAA; adresasAA;4;21;8;
pavardėAA; vardasAA; adresasAA;5;21;25;

Rezultatai 1:

Vartotojo sąsaja:
```

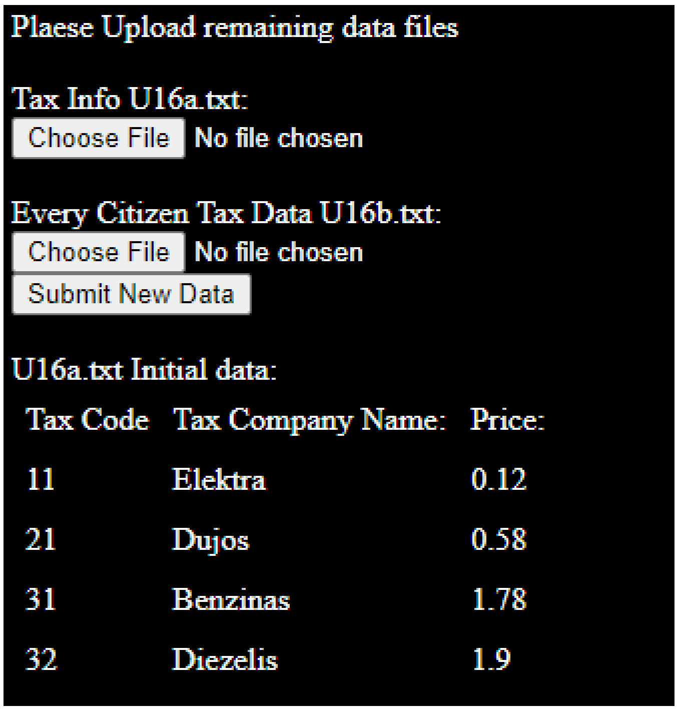
Duombazėje nerado jokio failo:


Plaese Upload remaining data files

Tax Info U16a.txt:

Every Citizen Tax Data U16b.txt:

Prikabinamo U16a.txt failą:


Plaese Upload remaining data files

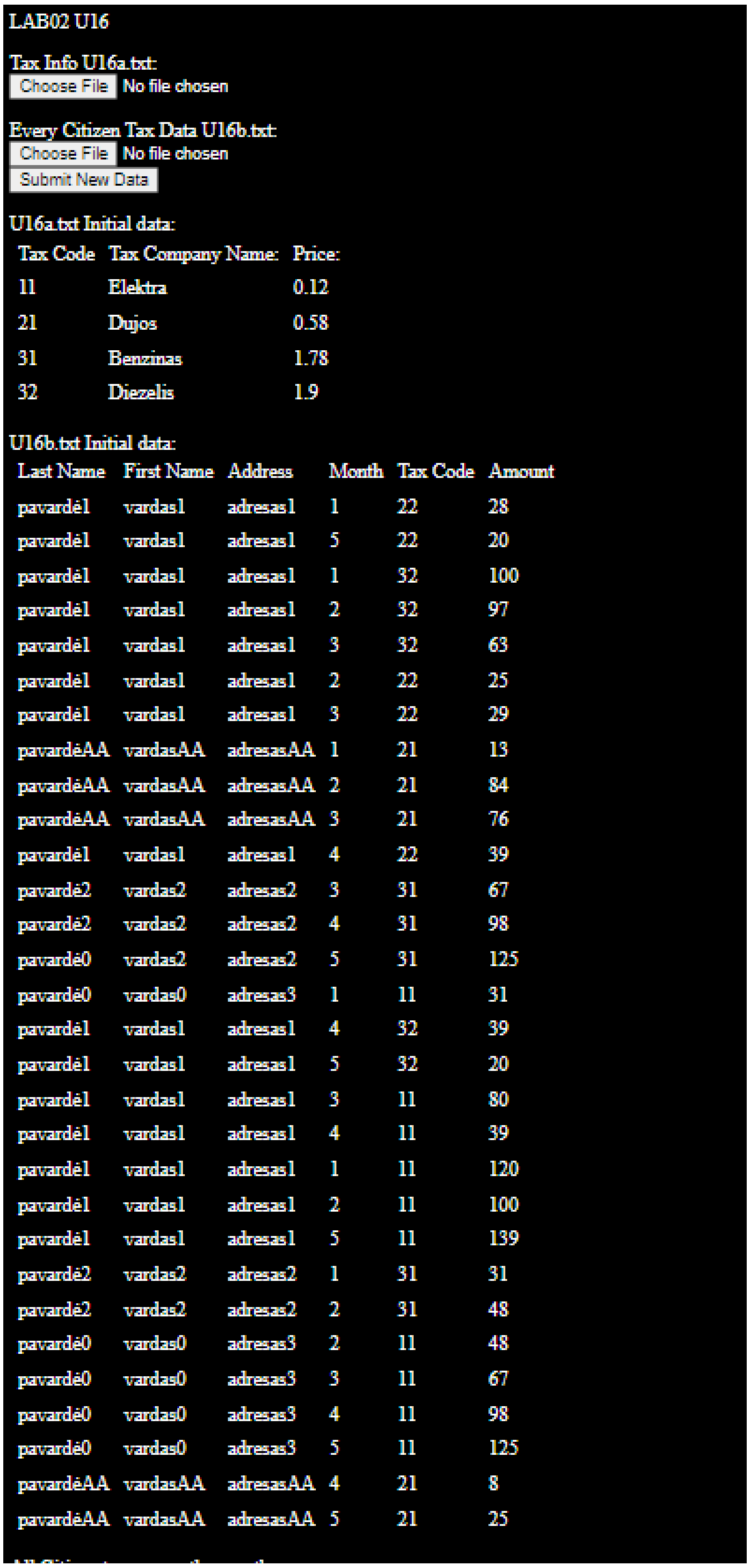
Tax Info U16a.txt:

Every Citizen Tax Data U16b.txt:

U16a.txt Initial data:

| Tax Code | Tax Company Name: | Price: |
|---|---|---|
| 11 | Elektra | 0.12 |
| 21 | Dujos | 0.58 |
| 31 | Benzinas | 1.78 |
| 32 | Diezelis | 1.9 |

Prikabinome U16b.txt:



LAB02 U16

Tax Info U16a.txt:

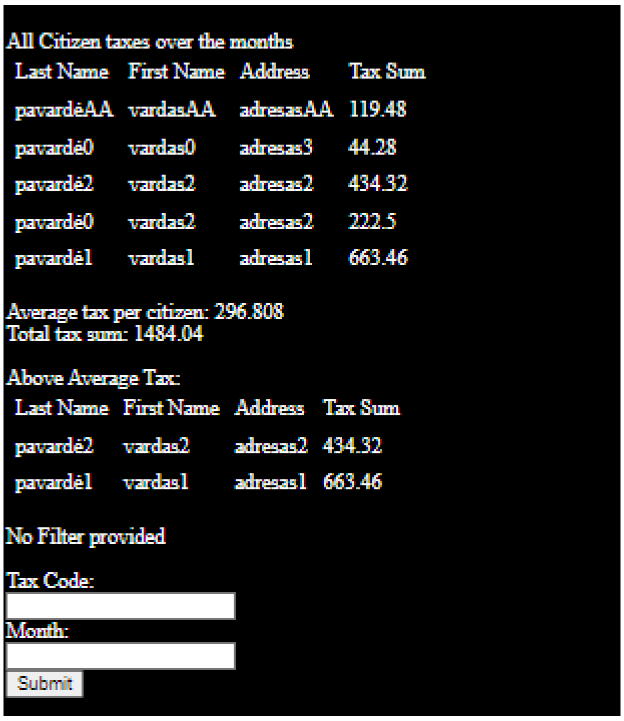
Every Citizen Tax Data U16b.txt:

U16a.txt Initial data:

| Tax Code | Tax Company Name: | Price: |
|---|---|---|
| 11 | Elektra | 0.12 |
| 21 | Dujos | 0.58 |
| 31 | Benzinas | 1.78 |
| 32 | Diezelis | 1.9 |

U16b.txt Initial data:

| Last Name | First Name | Address | Month | Tax Code | Amount |
|---|---|---|---|---|---|
| pavardė1 | vardas1 | adresas1 | 1 | 22 | 28 |
| pavardė1 | vardas1 | adresas1 | 5 | 22 | 20 |
| pavardė1 | vardas1 | adresas1 | 1 | 32 | 100 |
| pavardė1 | vardas1 | adresas1 | 2 | 32 | 97 |
| pavardė1 | vardas1 | adresas1 | 3 | 32 | 63 |
| pavardė1 | vardas1 | adresas1 | 2 | 22 | 25 |
| pavardė1 | vardas1 | adresas1 | 3 | 22 | 29 |
| pavardėAA | vardasAA | adresasAA | 1 | 21 | 13 |
| pavardėAA | vardasAA | adresasAA | 2 | 21 | 84 |
| pavardėAA | vardasAA | adresasAA | 3 | 21 | 76 |
| pavardė1 | vardas1 | adresas1 | 4 | 22 | 39 |
| pavardė2 | vardas2 | adresas2 | 3 | 31 | 67 |
| pavardė2 | vardas2 | adresas2 | 4 | 31 | 98 |
| pavardė0 | vardas2 | adresas2 | 5 | 31 | 125 |
| pavardė0 | vardas0 | adresas3 | 1 | 11 | 31 |
| pavardė1 | vardas1 | adresas1 | 4 | 32 | 39 |
| pavardė1 | vardas1 | adresas1 | 5 | 32 | 20 |
| pavardė1 | vardas1 | adresas1 | 3 | 11 | 80 |
| pavardė1 | vardas1 | adresas1 | 4 | 11 | 39 |
| pavardė1 | vardas1 | adresas1 | 1 | 11 | 120 |
| pavardė1 | vardas1 | adresas1 | 2 | 11 | 100 |
| pavardė1 | vardas1 | adresas1 | 5 | 11 | 139 |
| pavardė2 | vardas2 | adresas2 | 1 | 31 | 31 |
| pavardė2 | vardas2 | adresas2 | 2 | 31 | 48 |
| pavardė0 | vardas0 | adresas3 | 2 | 11 | 48 |
| pavardė0 | vardas0 | adresas3 | 3 | 11 | 67 |
| pavardė0 | vardas0 | adresas3 | 4 | 11 | 98 |
| pavardė0 | vardas0 | adresas3 | 5 | 11 | 125 |
| pavardėAA | vardasAA | adresasAA | 4 | 21 | 8 |
| pavardėAA | vardasAA | adresasAA | 5 | 21 | 25 |


All Citizen taxes over the months

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| pavardėAA | vardasAA | adresasAA | 119.48 |
| pavardė0 | vardas0 | adresas3 | 44.28 |
| pavardė2 | vardas2 | adresas2 | 434.32 |
| pavardė0 | vardas2 | adresas2 | 222.5 |
| pavardė1 | vardas1 | adresas1 | 663.46 |

Average tax per citizen: 296.808
Total tax sum: 1484.04

Above Average Tax:

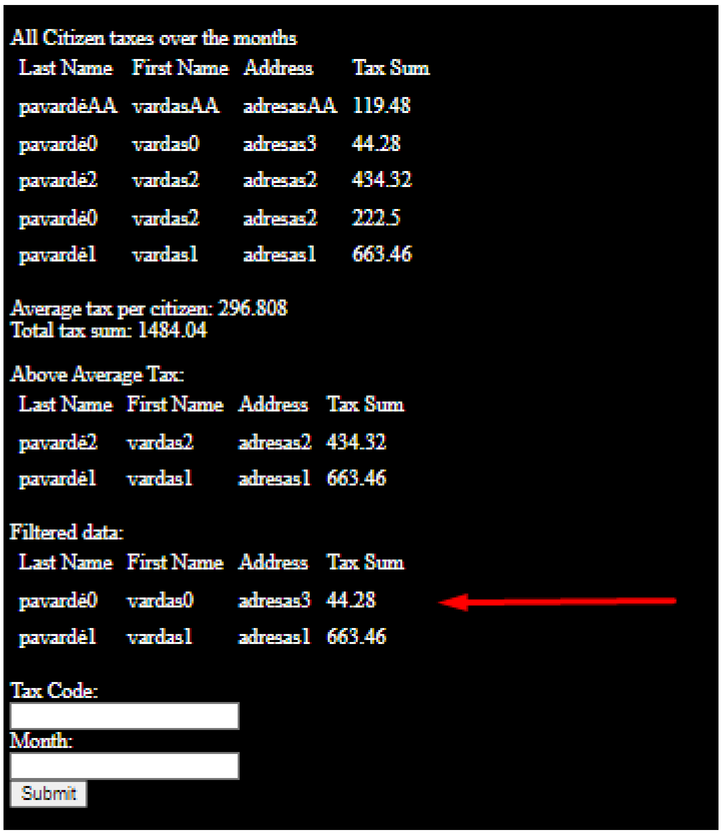
| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| pavardė2 | vardas2 | adresas2 | 434.32 |
| pavardė1 | vardas1 | adresas1 | 663.46 |

No Filter provided

Tax Code:

Month:

```
Prafiltravome duomenis pagal kodą: „11“, mėnesį: „2“. Prisidėjo lentelė papildoma.
```


All Citizen taxes over the months

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| pavardėAA | vardasAA | adresasAA | 119.48 |
| pavardė0 | vardas0 | adresas3 | 44.28 |
| pavardė2 | vardas2 | adresas2 | 434.32 |
| pavardė0 | vardas2 | adresas2 | 222.5 |
| pavardė1 | vardas1 | adresas1 | 663.46 |

Average tax per citizen: 296.808
Total tax sum: 1484.04

Above Average Tax:

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| pavardė2 | vardas2 | adresas2 | 434.32 |
| pavardė1 | vardas1 | adresas1 | 663.46 |

Filtered data:

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| pavardė0 | vardas0 | adresas3 | 44.28 |
| pavardė1 | vardas1 | adresas1 | 663.46 |

Tax Code:

Month:

U16result.txt:

```
Tax Sum of all citizens:

LastName            FirstName           |Address              |TaxSum    |
pavardė1             vardas1            | adresas1            |    663.46|
pavardėAA            vardasAA           | adresasAA           |    119.48|
pavardė2             vardas2            | adresas2            |    434.32|
pavardė0             vardas2            | adresas2            |    222.50|
pavardė0             vardas0            | adresas3            |     44.28|

Tax Sum of all citizens SORTED A-Z:

LastName            FirstName           |Address              |TaxSum    |
pavardėAA            vardasAA           | adresasAA           |    119.48|
pavardė0             vardas0            | adresas3            |     44.28|
pavardė2             vardas2            | adresas2            |    434.32|
pavardė0             vardas2            | adresas2            |    222.50|
pavardė1             vardas1            | adresas1            |    663.46|

All Citizen TOTAL Tax Sum: 1484.04

Average Tax Sum: 296.81

Citizens who paid above average:

LastName            FirstName           |Address              |TaxSum    |
pavardė2             vardas2            | adresas2            |    434.32|
pavardė1             vardas1            | adresas1            |    663.46|

Citizens who paid TaxCode: "11" on Month: "2"

LastName            FirstName           |Address              |TaxSum    |
pavardė0             vardas0            | adresas3            |     44.28|
pavardė1             vardas1            | adresas1            |    663.46|
```

Duomenys 2:

U16a.txt:

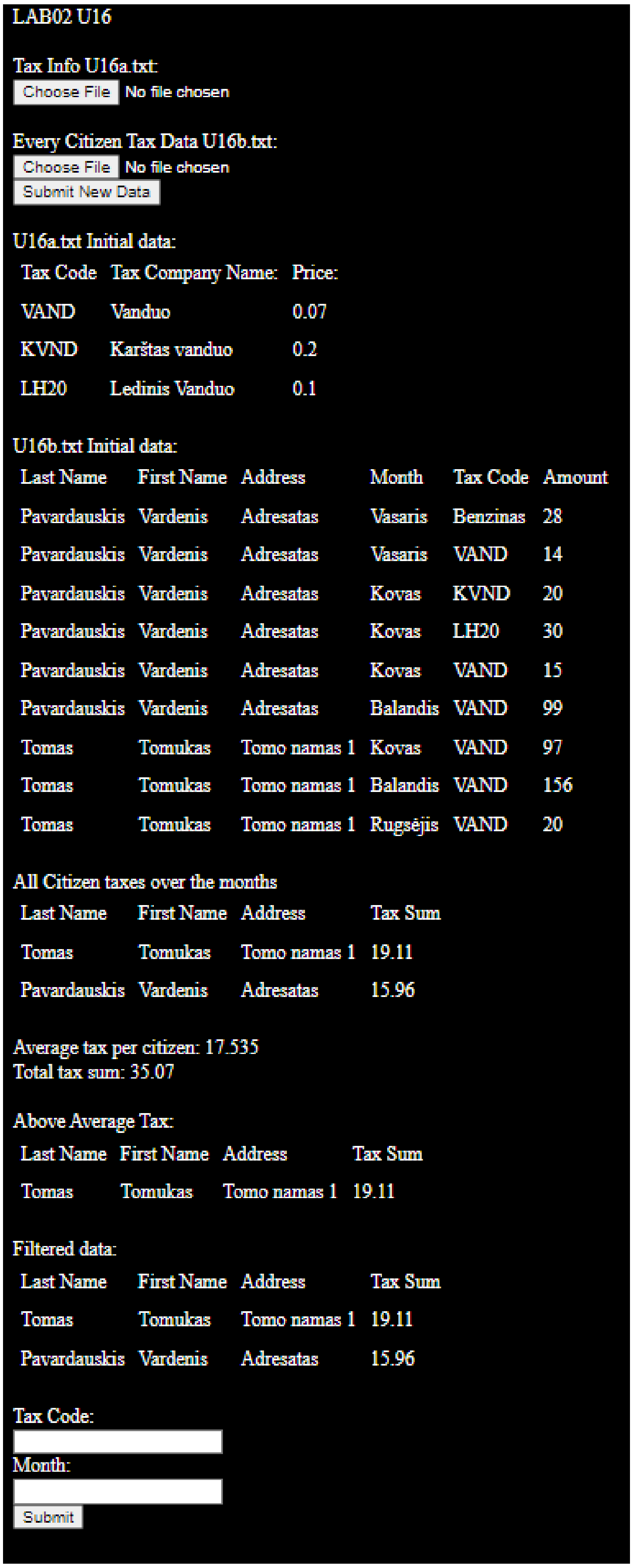
```
VAND; Vanduo; 0.07
KVND; Karštas vanduo; 0.20
LH20; Ledinis Vanduo; 0.10
```

U16b.txt:

```
Pavardauskis; Vardenis; Adresatas;Vasaris;Benzinas;28;
Pavardauskis; Vardenis; Adresatas;Vasaris;VAND;14;
Pavardauskis; Vardenis; Adresatas;Kovas;KVND;20;
Pavardauskis; Vardenis; Adresatas;Kovas;LH20;30;
Pavardauskis; Vardenis; Adresatas;Kovas;VAND;15;
Pavardauskis; Vardenis; Adresatas;Balandis;VAND;99;
Tomas; Tomukas; Tomo namas 1;Kovas;VAND;97;
Tomas; Tomukas; Tomo namas 1;Balandis;VAND;156;
Tomas; Tomukas; Tomo namas 1;Rugsėjis;VAND;20;
```

Rezultatai:

```
Vartotojo sąsaja
Naudojant mėnesį: Balandis ir mokesčių kodą: VAND:
```



LAB02 U16

Tax Info U16a.txt:
Choose File No file chosen

Every Citizen Tax Data U16b.txt:
Choose File No file chosen
Submit New Data

U16a.txt Initial data:

| Tax Code | Tax Company Name: | Price: |
|---|---|---|
| VAND | Vanduo | 0.07 |
| KVND | Karštas vanduo | 0.2 |
| LH20 | Ledinis Vanduo | 0.1 |

U16b.txt Initial data:

| Last Name | First Name | Address | Month | Tax Code | Amount |
|---|---|---|---|---|---|
| Pavardauskis | Vardenis | Adresatas | Vasaris | Benzinas | 28 |
| Pavardauskis | Vardenis | Adresatas | Vasaris | VAND | 14 |
| Pavardauskis | Vardenis | Adresatas | Kovas | KVND | 20 |
| Pavardauskis | Vardenis | Adresatas | Kovas | LH20 | 30 |
| Pavardauskis | Vardenis | Adresatas | Kovas | VAND | 15 |
| Pavardauskis | Vardenis | Adresatas | Balandis | VAND | 99 |
| Tomas | Tomukas | Tomo namas 1 | Kovas | VAND | 97 |
| Tomas | Tomukas | Tomo namas 1 | Balandis | VAND | 156 |
| Tomas | Tomukas | Tomo namas 1 | Rugsėjis | VAND | 20 |

All Citizen taxes over the months

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| Tomas | Tomukas | Tomo namas 1 | 19.11 |
| Pavardauskis | Vardenis | Adresatas | 15.96 |

Average tax per citizen: 17.535
Total tax sum: 35.07

Above Average Tax:

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| Tomas | Tomukas | Tomo namas 1 | 19.11 |

Filtered data:

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| Tomas | Tomukas | Tomo namas 1 | 19.11 |
| Pavardauskis | Vardenis | Adresatas | 15.96 |

Tax Code:

Month:

Submit

```
U16result.txt:

Tax Sum of all citizens:

LastName            FirstName           |Address             |TaxSum    |
Pavardauskis         Vardenis           | Adresatas          |     15.96|
Tomas                Tomukas            | Tomo namas 1       |     19.11|

Tax Sum of all citizens SORTED A-Z:

LastName            FirstName           |Address             |TaxSum    |
Tomas                Tomukas            | Tomo namas 1       |     19.11|
Pavardauskis         Vardenis           | Adresatas          |     15.96|

All Citizen TOTAL Tax Sum: 35.07

Average Tax Sum: 17.54

Citizens who paid above average:

LastName            FirstName           |Address             |TaxSum    |
Tomas                Tomukas            | Tomo namas 1       |     19.11|

Citizens who paid TaxCode: "VAND" on Month: "Balandis"

LastName            FirstName           |Address             |TaxSum    |
Tomas                Tomukas            | Tomo namas 1       |     19.11|
Pavardauskis         Vardenis           | Adresatas          |     15.96|
```

## 2.8. Dėstytojo pastabos

1. Klasių diagramoje nebūna žodžių private ar public. Tam yra spec. simboliai.
2. Negalima private int count;
3. Kam žodis internal, internal class Node?
4. Negalim painioti su sąsaja:
   public TableRow GetRow(int index
5. Taip neturi būti:
   public string TaxCode { get; set; }
   public string TaxName { get; set; }
   public double Price { get; set; }
   public Node next;
6. Kur klasės Tax sąsajos metodai?
   Perdaryti.
7. Negaliu sutikti su tokia klase Node:
   public Node(string lastName, string firstName, string address)
   {
   Data = new CitizenData(lastName, firstName, address);
   }

```
/// <summary>
/// Swaps the DATA, keeps the pointers
/// </summary>
/// <param name="other">Other node to be swapped with</param>
public void SwapData(Node other)
{
CitizenData temp = Data;
Data = other.Data;
other.Data = temp;
}
```

8. Nėra klasės InoutUtils.
9. AddMoney(string lastName, string firstName, string address, double Kodėl ne citizen?
10. Kodėl nėra Next antraštėje?
    public Node(CitizenData data)

Laboratorinio įvertinimas: 6

Testo taškai: 0

Bendras: 6

# 3. Bendrinės klasės ir testavimas (L3)

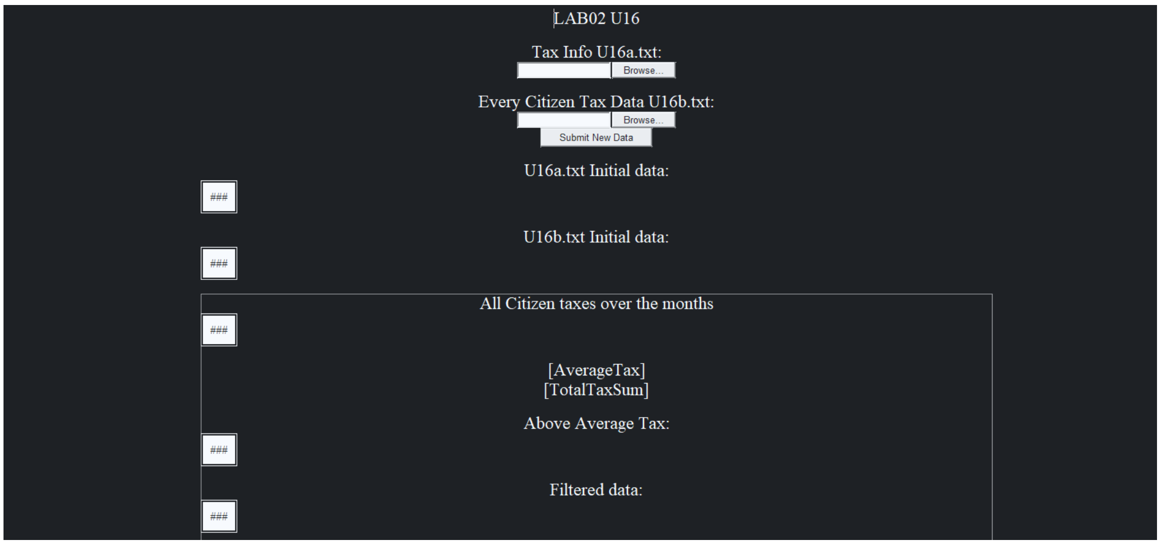
## 3.1. Darbo užduotis

LD_16. **Mokesčiai**. Kiekvieną mėnesį gyventojai moka komunalinius mokesčius. Suraskite, kurį mėnesį ir kokie komunaliniai mokesčiai kainavo pigiausiai. Apskaičiuokite, kokią pinigų sumą komunaliniams mokesčiams išleido visi gyventojai. Sudarykite sąrašą gyventojų (pavardė ir vardas, adresas), kurie už komunalines paslaugas per metus mokėjo sumą, mažesnę už vidutinę. Sąrašas turi būti surikiuotas pagal gyventojų adresus, pavardes ir vardus abėcėlės tvarka.
Duomenys:

- tekstiniame faile U16a.txt yra informacija apie komunalines paslaugas: paslaugos kodas, paslaugos pavadinimas, paslaugos vieno mėnesio vieno vieneto kaina;
- tekstiniame faile U16b.txt yra informacija apie gyventojus: pavardė ir vardas, adresas, mėnuo už kurį mokama, komunalinės paslaugos kodas, sunaudotų per mėnesį vienetų kiekis.

Pašalinkite iš sąrašo gyventojus, kurie nemokėjo už nurodytą paslaugą, nurodytą mėnesį (duomenys įvedami klaviatūra).

## 3.2. Grafinės vartotojo sąsajos schema


LAB02 U16

Tax Info U16a.txt:

Every Citizen Tax Data U16b.txt:

U16a.txt Initial data:

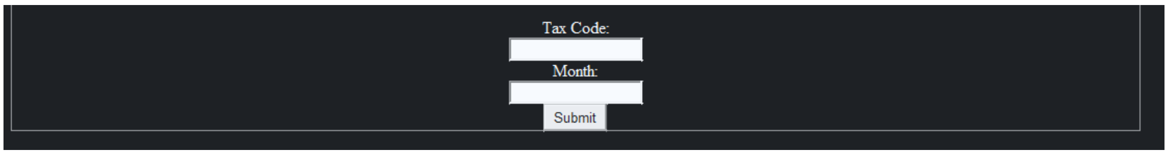
U16b.txt Initial data:

All Citizen taxes over the months

[AverageTax]
[TotalTaxSum]

Above Average Tax:

Filtered data:


Tax Code:

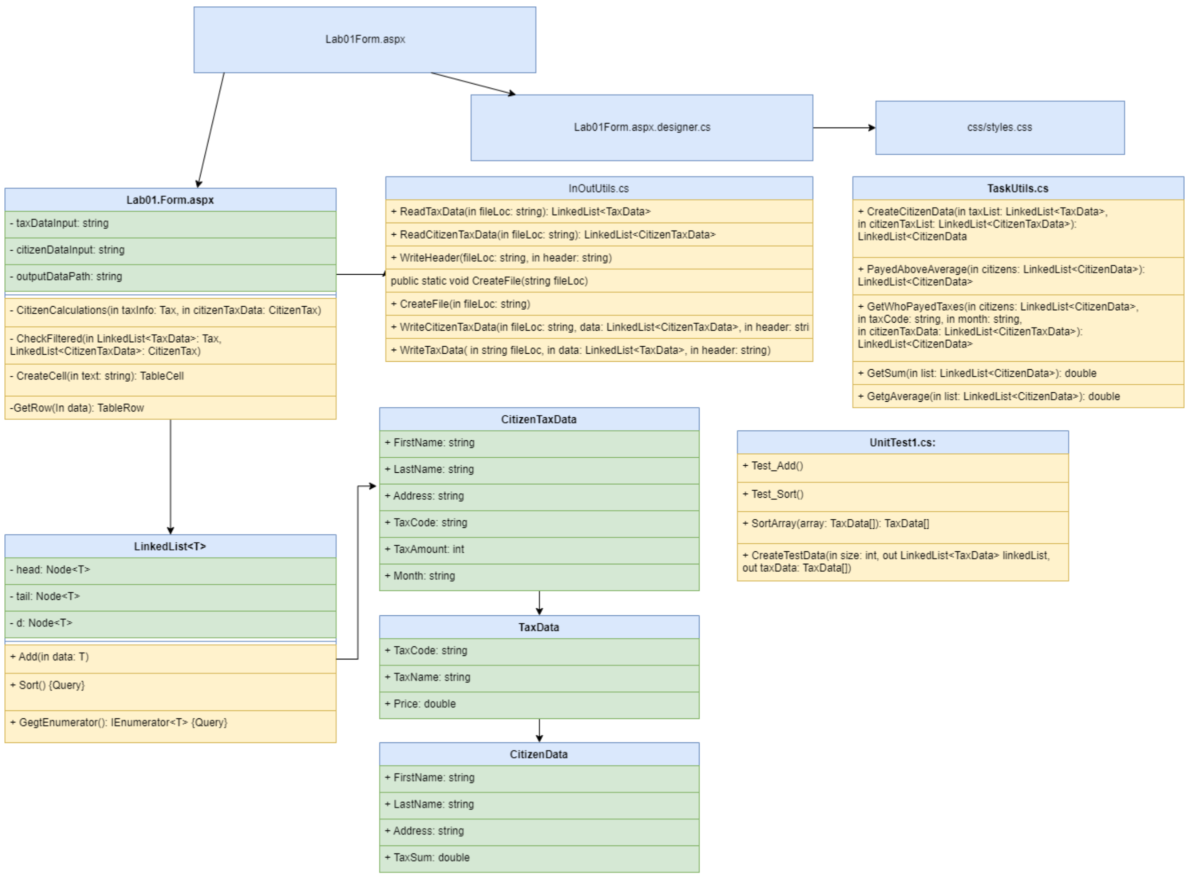
Month:

## 3.3. Sąsajoje panaudotų komponentų keičiamos savybės

| Komponentas | Savybė | Reikšmė |
|---|---|---|
| HeaderLabel | Text | LAB02 U16 |
| Label1 | Text | Tax InfoU16a.txt: |
| Label2 | Text | Every Citizen Tax Data U16b: |
| InitTaxLabel | Text | U16a.txt Initial data: |
| InitCitizenLabel | Text | U16b.txt Initial data: |
| CitizenTaxLabel | Text | All Citizen taxes over the months |

| | | |
|---|---|---|
| AverageTax | Text | “” |
| TotalTaxSum | Text | “” |
| CitizenTaxLabel0 | Text | Above Average Tax: |
| FilterData | Text | Filtered data: |
| ButtonFilter | Text | Tax Code: |
| DataButton | Text | Month: |

## 3.4. Klasių diagrama



Lab01Form.aspx
Lab01Form.aspx.designer.cs
css/styles.css
Lab01.Form.aspx
- taxDataInput: string
- citizenDataInput: string
- outputDataPath: string
- CitizenCalculations(in taxInfo: Tax, in citizenTaxData: CitizenTax)
- CheckFiltered(in LinkedList<TaxData>: Tax, LinkedList<CitizenTaxData>: CitizenTax)
- CreateCell(in text: string): TableCell
-GetRow(In data): TableRow
InOutUtils.cs
+ ReadTaxData(in fileLoc: string): LinkedList<TaxData>
+ ReadCitizenTaxData(in fileLoc: string): LinkedList<CitizenTaxData>
+ WriteHeader(fileLoc: string, in header: string)
public static void CreateFile(string fileLoc)
+ CreateFile(in fileLoc: string)
+ WriteCitizenTaxData(in fileLoc: string, data: LinkedList<CitizenTaxData>, in header: stri
+ WriteTaxData( in string fileLoc, in data: LinkedList<TaxData>, in header: string)
TaskUtils.cs
+ CreateCitizenData(in taxList: LinkedList<TaxData>, in citizenTaxList: LinkedList<CitizenTaxData>): LinkedList<CitizenData
+ PayedAboveAverage(in citizens: LinkedList<CitizenData>): LinkedList<CitizenData>
+ GetWhoPayedTaxes(in citizens: LinkedList<CitizenData>, in taxCode: string, in month: string, in citizenTaxData: LinkedList<CitizenTaxData>): LinkedList<CitizenData>
+ GetSum(in list: LinkedList<CitizenData>): double
+ GetgAverage(in list: LinkedList<CitizenData>): double
CitizenTaxData
+ FirstName: string
+ LastName: string
+ Address: string
+ TaxCode: string
+ TaxAmount: int
+ Month: string
UnitTest1.cs:
+ Test_Add()
+ Test_Sort()
+ SortArray(array: TaxData[]): TaxData[]
+ CreateTestData(in size: int, out LinkedList<TaxData> linkedList, out taxData: TaxData[])
LinkedList<T>
- head: Node<T>
- tail: Node<T>
- d: Node<T>
+ Add(in data: T)
+ Sort() {Query}
+ GegtEnumerator(): IEnumerator<T> {Query}
TaxData
+ TaxCode: string
+ TaxName: string
+ Price: double
CitizenData
+ FirstName: string
+ LastName: string
+ Address: string
+ TaxSum: double

## 3.5. Programos vartotojo vadovas

Jeigu neranda failų visų duombazėje, programa paprašo failų. Jeigu randa tik vieną pradinį failą, rodo tik jį ir prašo likusių failų. Kai abu failai atsiranda duombazėje, užkrauna skaičiavimus. Apskaičiuoja vidutinę mokesčių kainą, sumą visų ir individualių žmonių. Tekstas yra rikiuojamas A-Z pagal: adresą, pavardę, vardą. Kodas leidžia filtruoti žmones, kurie mokėjo nurodytą mėnesį (mėnuo yra string) už nurodytus mokesčius naudojant „Tax Code“ (string). Prie filtered lentelės prideda tik filtruotus duomenis.

## 3.6. Programos tekstas

CitizenData.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab02
{
    /// <summary>
    /// CitizenData class object to be used by class Citizen
    /// </summary>
    public class CitizenData : IComparable<CitizenData>, IEquatable<CitizenData>
    {

        public string FirstName { get; set; }
        public string LastName { get; set; }
        public string Address { get; set; }

        public double TaxSum { get; set; }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="lastName">Last name of the citizen</param>
        /// <param name="firstName">First Name of the citizen</param>
        /// <param name="address">Address of the citizen</param>
        public CitizenData(string lastName, string firstName, string address, double
taxSum)
        {
            LastName = lastName;
            FirstName = firstName;
            Address = address;
            TaxSum = taxSum;
        }


        /// <summary>
        /// To String override
        /// </summary>
        /// <returns>stringg format of the citizen</returns>
        public override string ToString()
        {
            return $"{LastName,-20} {FirstName,-20}|{Address,-20}|{TaxSum,10:f}|";
        }

        /// <summary>
        /// Compares to other Node of citizen type
        /// </summary>
        /// <param name="other"></param>
        /// <returns>Integer</returns>
        public int CompareTo(CitizenData other)
        {
            int comparison = other.Address.CompareTo(Address);
            if (comparison == 0)
            {
                comparison = other.LastName.CompareTo(LastName);
                if (comparison == 0)
                {
                    comparison = other.FirstName.CompareTo(FirstName);
                }
            }
            return comparison;
        }

        /// <summary>
        /// IEquatable iomplementation
        /// </summary>
        /// <param name="other">Comparison object</param>
        /// <returns>Boolean</returns>
        public bool Equals(CitizenData other)
        {
            if (FirstName == other.FirstName && LastName == other.LastName && Address ==
other.Address)
                return true;
            return false;
        }

        /// <summary>
        /// IEquatable iomplementation
        /// </summary>
        /// <param name="other">Comparison object</param>
        /// <returns>Boolean</returns>
        public bool Equals(CitizenTaxData other)
        {
            if (FirstName == other.FirstName && LastName == other.LastName && Address ==
other.Address)
                return true;
            return false;
        }
    }
}
```

CitizenTaxData.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab02
{
    public class CitizenTaxData : IComparable<CitizenTaxData>, IEquatable<CitizenTaxData>
    {

        public string FirstName { get; set; }
        public string LastName { get; set; }
        public string Address { get; set; }
        public string TaxCode { get; set; }
        public int TaxAmount { get; set; }
        public string Month { get; set; }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="lastName">last name of citizen</param>
        /// <param name="firstName">first name of citizen</param>
        /// <param name="address">address of the citizen</param>
        /// <param name="month">the month the tax was paid</param>
        /// <param name="taxCode">tax code</param>
        /// <param name="taxAmount">tax amount</param>
        public CitizenTaxData(string lastName, string firstName, string address, string
month, string taxCode, int taxAmount)
        {
            FirstName = firstName;
            LastName = lastName;
            Address = address;
            TaxCode = taxCode;
            TaxAmount = taxAmount;
            Month = month;
        }

        /// <summary>
        /// ToString implementation
        /// </summary>
        /// <returns>String</returns>
        public override string ToString()
        {
            return $"{LastName,-20} {FirstName,-20}|{Address,-20}|{Month,-15}|{TaxCode,-
20}|{TaxAmount,10}|";
        }

        /// <summary>
        /// IEquatable implementation
        /// </summary>
        /// <param name="other">Comparison object</param>
        /// <returns>Boolean</returns>
        public bool Equals(CitizenTaxData other)
        {
            if (FirstName == other.FirstName && LastName == other.LastName && Address ==
other.Address)
                return true;
            return false;
        }

        /// <summary>
        /// IComparable Implementation
        /// </summary>
        /// <param name="other">Comparison object</param>
        /// <returns>Integer</returns>
        public int CompareTo(CitizenTaxData other)
        {
            int comparison = LastName.CompareTo(other.LastName);
            if (comparison == 0)
            {
                comparison = FirstName.CompareTo(other.FirstName);
                if (comparison == 0)
                    comparison = TaxAmount.CompareTo(other.TaxAmount);
            }

            return comparison;
        }
    }
}
```

TaxData.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab02
{
    /// <summary>
    /// TaxData object to be inherited by Tax object
    /// </summary>
    public class TaxData : IComparable<TaxData>, IEquatable<TaxData>
    {
        public string TaxCode { get; set; }
        public string TaxName { get; set; }
        public double Price { get; set; }
        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="taxCode"></param>
        /// <param name="taxName"></param>
        /// <param name="price"></param>
        public TaxData(string taxCode, string taxName, double price)
        {
            TaxCode = taxCode;
            TaxName = taxName;
            Price = price;
        }

        /// <summary>
        /// Returns Node in string format
        /// </summary>
        /// <returns>Node in string format</returns>
        public override string ToString()
        {
            return $"{TaxCode,-20}|{TaxName,-20}|{Price,10:f}|";
        }

        /// <summary>
        /// IComparable implementation
        /// </summary>
        /// <param name="other">Comparison object</param>
        /// <returns>Integer</returns>
        public int CompareTo(TaxData other)
        {
            int comparison = Price.CompareTo(other.Price);
            return comparison;
        }

        /// <summary>
        /// IEquatable implementation
        /// </summary>
        /// <param name="other"> comparison object </param>
        /// <returns>boolean</returns>
        public bool Equals(TaxData other)
        {
            if (TaxCode == other.TaxCode)
                return true;
            return false;
        }
    }
}
```

LinkedList.cs:

```
using System;
using System.Collections;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab02
{
    /// <summary>
    /// Linked List Class Object
    /// </summary>
    /// <typeparam name="T">Object Type</typeparam>
    public class LinkedList<T> : IEnumerable<T> where T : IComparable<T>, IEquatable<T>
    {
        private Node<T> head;
        private Node<T> tail;
        private Node<T> d;

        /// <summary>
        /// Construcotr
        /// </summary>
        public LinkedList()
        {
            head = null;
            tail = null;
        }

        //Deprecated, Use Foreach with IEnumerable
        /** Address of the head of the list is assigned */
        public void Begin()
        { d = head; }
        /** Interface variable gets address of the next entry*/
        public void Next()
        { d = d.next; }
        /** Return true, if list is empty*/
        public bool Exist()
        { return d != null; }
        //-------------------------------------------------
        /** Return data according to the interface address*/
        public T Get()
        { return d.Data; }

        /// <summary>
        /// Adds T object to  Linked List
        /// </summary>
        /// <param name="data"> <T> Type Object</param>
        public void Add(T data)
        {
            // If No citizen was found, adds the citizen to Linked List
            if (head == null)
            {
                head = new Node<T>(data, null);
                tail = head;
            }
            else
            {
                tail.next = new Node<T>(data, null);
                tail = tail.next;
            }
        }

        /// <summary>
        /// Sort Function using iComprable
        /// </summary>
        public void Sort()
        {

            Node<T> timer = head;
            while (timer != null)
            {
                Node<T> curr = head;
                Node<T> next = head.next;
                while (next != null)
                {
                    if (curr.Data.CompareTo(next.Data) > 0)
                    {
                        curr.SwapData(next);
                    }
                    curr = next;
                    next = next.next;
                }
                timer = timer.next;
            }
```

```
        }

        /// <summary>
        /// IEnumerable implementation
        /// </summary>
        /// <returns>yield of T data</returns>
        public IEnumerator<T> GetEnumerator()
        {
            for (Node<T> dd = head; dd != null; dd = dd.next)
            {
                yield return dd.Data;
            }
        }

        /// <summary>
        /// Obligatory, since IEnumerable<T> inherits IEnumerable
        /// </summary>
        /// <returns>none</returns>
        /// <exception cref="NotImplementedException">Not Implemented</exception>
        IEnumerator IEnumerable.GetEnumerator()
        {
            throw new NotImplementedException();
        }

        /// <summary>
        /// Node class to be used to save every citizen seperately
        /// </summary>
        class Node<T>
        {
            public T Data { get; set; }
            public Node<T> next { get; set; }

            /// <summary>
            /// Constructor
            /// </summary>
            /// <param name="data">CitizenData pointer</param>
            public Node(T data, Node<T> link)
            {
                Data = data;
                next = link;
            }

            /// <summary>
            /// Swaps the DATA, keeps the pointers
            /// </summary>
            /// <param name="other">Other node to be swapped with</param>
            public void SwapData(Node<T> other)
            {
                T temp = Data;
                Data = other.Data;
                other.Data = temp;
            }
        }
    }
}
```

TaskUtils.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI.WebControls;

namespace Lab02
```

```
{
    /// <summary>
    /// TaskUtils static class for helper functions
    /// </summary>
    public static class TaskUtils
    {

        /// <summary>
        /// Creates Citizen class object using Tax object
        /// </summary>
        /// <param name="TaxList">Tax class object</param>
        /// <param name="citizenTaxList">CitizenTax object</param>
        /// <returns>Citizen class object</returns>
        public static LinkedList<CitizenData> CreateCitizenData(LinkedList<TaxData>
taxList, LinkedList<CitizenTaxData> citizenTaxList)
        {
            LinkedList<CitizenData> citizens = new LinkedList<CitizenData>();
            // Goes through every tax data record
            foreach (CitizenTaxData citizenTaxData in citizenTaxList)
            {
                // Finds the the tax code and returns price
                foreach(TaxData taxData in taxList)
                {
                    if(citizenTaxData.TaxCode == taxData.TaxCode)
                    {
                        CitizenData temp = null;
                        // Finds the citizen if already exists
                        foreach (CitizenData citizen in citizens)
                        {
                            // Finds the citizen if it already exists
                            if(citizen.Equals(citizenTaxData))
                            {
                                temp = citizen;
                                break;
                            }
                        }

                        // Creates a new citizen or appends the data
                        if (temp != null)
                        {
                            temp.TaxSum += (double)taxData.Price *
citizenTaxData.TaxAmount;
                        }
                        else
                        {
                            temp = new CitizenData(citizenTaxData.LastName,
citizenTaxData.FirstName, citizenTaxData.Address, (double)taxData.Price *
citizenTaxData.TaxAmount);
                            citizens.Add(temp);
                        }

                    }
                }
            }

            return citizens;
        }

        /// <summary>
        /// Returns a list for people who payed above average
        /// </summary>
        /// <param name="citizens">CitizenData Linked List</param>
        /// <returns>Citizen Data Linked List</returns>
        public static LinkedList<CitizenData> PayedAboveAverage(LinkedList<CitizenData>
citizens)
        {
            double average = GetAverage(citizens);
            LinkedList<CitizenData> output = new LinkedList<CitizenData>();

            foreach (CitizenData citizen in citizens)
            {
                if (citizen.TaxSum >= average)
                {
                    output.Add(citizen);
                }
            }

            return output;
        }

         /// <summary>
         /// Creates a new list who payed taxes specified tax, month
         ///
         /// </summary>
         /// <param name="citizens">CitizenData Linked List</param>
         /// <param name="taxCode">Tax Code to filter by</param>
         /// <param name="month">Month to filter by</param>
         /// <param name="citizenTaxData">CitizenTaxData Linked List</param>
         /// <returns></returns>
        public static LinkedList<CitizenData> GetWhoPayedTaxes(LinkedList<CitizenData>
citizens, string taxCode, string month, LinkedList<CitizenTaxData> citizenTaxData)
        {
            LinkedList<CitizenData> output = new LinkedList<CitizenData>();
            foreach (CitizenData citizen in citizens)
            {
                foreach (CitizenTaxData citizenTax in citizenTaxData)
                {
                    if(citizenTax.TaxCode == taxCode && citizenTax.Month == month &&
citizen.Equals(citizenTax))
                    {
                        output.Add(citizen);
                        break;
                    }
                }
            }
            return output;
        }

        /// <summary>
        /// Returns Sum
        /// </summary>
        /// <param name="list">CitizenData LinkedList</param>
        /// <returns>Double</returns>
        public static double GetSum(LinkedList<CitizenData> list)
        {
            double sum = 0;
            foreach (CitizenData citizen in list)
                sum += citizen.TaxSum;

            return sum;
        }

        /// <summary>
        /// Gets Average
        /// </summary>
        /// <param name="list">CitizenData Linked List</param>
        /// <returns>Double</returns>
        public static double GetAverage(LinkedList<CitizenData> list)
        {
            double sum = 0;
            int i = 0;
            foreach (CitizenData citizen in list)
            {
                sum += citizen.TaxSum;
                i++;
            }

            return (double)(i > 0 ? sum / i : 0);
        }


    }
}
```

InOutUtils.cs:

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
using System.Web;

namespace Lab02
{
    /// <summary>
    /// Static InOutUtils helper class for Input/Output with files
    /// </summary>
    public static class InOutUtils
    {
        /// <summary>
        /// Reads Tax Data from txt to Tax class object+
        /// </summary>
        /// <param name="fileLoc">Location of the data in .txt format</param>
        /// <returns>Linked ListTaxData class object</returns>
        public static LinkedList<TaxData> ReadTaxData(string fileLoc)
        {
            LinkedList<TaxData> taxes = new LinkedList<TaxData>();
            string[] lines = File.ReadAllLines(fileLoc);
            foreach (string line in lines)
            {
                string[] elements = line.Split(';');
                taxes.Add(new TaxData(elements[0], elements[1],
double.Parse(elements[2])));
            }
            return taxes;
        }

        /// <summary>
        /// Creates CitizenTaxData from .txt file
        /// </summary>
        /// <param name="fileLoc">Location of .txt file</param>
        /// <returns>LinkedList CitizenTaxData class object</returns>
        public static LinkedList<CitizenTaxData> ReadCitizenTaxData(string fileLoc)
        {
            LinkedList<CitizenTaxData> data = new LinkedList<CitizenTaxData>();
            string[] lines = File.ReadAllLines(fileLoc);
            foreach (string line in lines)
            {
                string[] elements = line.Split(';');
                CitizenTaxData temp = new CitizenTaxData(elements[1], elements[0],
elements[2], elements[3], elements[4], int.Parse(elements[5]));
                data.Add(temp);
            }
            return data;
        }

        /// <summary>
        /// Appends a header to a file
        /// </summary>
        /// <param name="fileLoc">Name/location of the file</param>
        /// <param name="header">text to be appended</param>
        public static void WriteHeader(string fileLoc, string header)
        {
            using (StreamWriter writer = new StreamWriter(fileLoc, append: true))
            {
                writer.WriteLine(header);
                writer.WriteLine();
            }
        }

        /// <summary>
        /// Creates a new or wipes a file
        /// </summary>
        /// <param name="fileLoc">Location of the file</param>
        public static void CreateFile(string fileLoc)
        {
            using (FileStream fs = new FileStream(fileLoc, FileMode.Create))
                new StreamWriter(fs, encoding: System.Text.Encoding.UTF8).Close();
        }

        /// <summary>
        /// Appends CitizenTaxData to a file
        /// </summary>
        /// <param name="fileLoc">Location/name of the file</param>
        /// <param name="data">data to append to the .txt file</param>
        /// <param name="header">Header text of the data file</param>
        public static void WriteCitizenTaxData(string fileLoc, LinkedList<CitizenTaxData>
data, string header)
        {
            using (StreamWriter writer = new StreamWriter(fileLoc, append:true))
            {
                writer.WriteLine(header);
                writer.WriteLine();
                writer.WriteLine($"{"LastName",-20} {"FirstName",-20}|{"Address",-
20}|{"Month",-15}|{"TaxCode",-20}|{"TaxAmount",10}|");
                foreach (CitizenTaxData taxData in data)
                {
                    writer.WriteLine(taxData.ToString());
                }
                writer.WriteLine();
            }
        }

        /// <summary>
        /// appends Citizen class object data to text file
        /// </summary>
        /// <param name="fileLoc">location/name of the file</param>
        /// <param name="data">data to append to the file</param>
        /// <param name="header">Header of the file</param>
        public static void WriteCitizenData(string fileLoc, LinkedList<CitizenData> data,
string header)
        {
            using (StreamWriter writer = new StreamWriter(fileLoc, append: true))
            {
                writer.WriteLine(header);
                writer.WriteLine();
                writer.WriteLine($"{"LastName",-20} {"FirstName",-20}|{"Address",-
20}|{"TaxSum",-10}|");
                foreach (CitizenData taxData in data)
                {
                    writer.WriteLine(taxData.ToString());
                }
                writer.WriteLine();
            }
        }
        /// <summary>
        /// Appends Tax data to a .txt file
        /// </summary>
        /// <param name="fileLoc">Location/name of the file</param>
        /// <param name="data">data to append to the .txt file</param>
        /// <param name="header">header to be added to the file</param>
        public static void WriteTaxData(string fileLoc, LinkedList<TaxData> data, string
header)
        {
            using (StreamWriter writer = new StreamWriter(fileLoc, append: true))
            {
                writer.WriteLine(header);
                writer.WriteLine();
                writer.WriteLine($"{"TaxCode",-20}|{"TaxName",-20}|{"Price",10:2f}|");
                foreach (TaxData taxData in data)
                {
                    writer.WriteLine(taxData.ToString());
                }
                writer.WriteLine();
            }
        }
    }
}
```

UnitTest1.cs:

```
using Microsoft.VisualStudio.TestTools.UnitTesting;
using System;
using Lab02;

namespace UnitTest
{
    [TestClass]
    public class UnitTest1
    {
        /// <summary>
        /// Compares CitizenData object with same parameters. Comparison should return 0
        /// </summary>
        [TestMethod]
        public void CompareTo_CitizenDataSame_Returns0()
        {
            CitizenData cData1 = new CitizenData("lastname", "firstname", "address", 0);
            CitizenData cData2 = new CitizenData("lastname", "firstname", "address", 0);
            Assert.AreEqual(cData1.CompareTo(cData2),0);
        }

        /// <summary>
        /// Compares lhs CitizenData object with alphabetically higher parameters.
Comparison should return 1
        /// </summary>
        [TestMethod]
        public void CompareTo_CitizenDataSame_Returns1()
        {
            CitizenData cData1 = new CitizenData("a", "a", "a", 0);
            CitizenData cData2 = new CitizenData("b", "b", "b", 0);
            Assert.AreEqual(cData1.CompareTo(cData2), 1);
        }

        /// <summary>
        /// Compares lhs CitizenData object with alphabetically lower parameters.
Comparison should return -1
        /// </summary>
        [TestMethod]
        public void CompareTo_CitizenDataSame_ReturnsMinus1()
        {
            CitizenData cData1 = new CitizenData("b", "b", "b", 0);
            CitizenData cData2 = new CitizenData("a", "a", "a", 0);
            Assert.AreEqual(cData1.CompareTo(cData2), -1);
        }

        /// <summary>
        /// Tests CitizenTax and CitizenTaxData object comparison with different
parameters
        /// </summary>
        [TestMethod]
        public void Equals_CitizenDataCitizenTaxDataDifferentParameters_False()
        {
            CitizenData cData = new CitizenData("lastname1", "firstname1", "address1",
0);
            CitizenTaxData cTaxData = new CitizenTaxData("lastname0", "firstname0",
"address0", "April", "0", 0);
            Assert.IsFalse(cData.Equals(cTaxData));
        }

        /// <summary>
        /// Tests CitizenTax and CitizenTaxData object comparison with same parameters
        /// </summary>
        [TestMethod]
        public void Equals_CitizenDataCitizenTaxDataSameParameters_True()
        {
            CitizenData cData = new CitizenData("lastname", "firstname", "address", 0);
            CitizenTaxData cTaxData = new CitizenTaxData("lastname", "firstname",
"address", "April", "0", 0);
            Assert.IsTrue(cData.Equals(cTaxData));
        }

        /// <summary>
        /// Tests 2 Citizen Data Comparison with same parameters. Should Return True.
        /// </summary>
        [TestMethod]
        public void Equals_CitizenDataSameParameters_True()
        {
            CitizenData cData1 = new CitizenData("lastname1", "firstname1", "address1",
0);
            CitizenData cData2 = new CitizenData("lastname1", "firstname1", "address1",
0);

            Assert.IsTrue(cData1.Equals(cData2));
        }

        /// <summary>
        /// Tests 2 Citizen Data Comparison with different Keys. Should Return false.
        /// </summary>
        [TestMethod]
        public void Equals_CitizenDataDifferentParameters_False()
        {
            CitizenData cData1 = new CitizenData("lastname1", "firstname1", "address1",
0);
            CitizenData cData2 = new CitizenData("lastname2", "firstname2", "address2",
0);

            Assert.IsFalse(cData1.Equals(cData2));
        }

        /// <summary>
        /// Tets add function and compares to array
        /// </summary>
        [TestMethod]
        public void Add_LinkedListArrayEquality_True()
        {
            TaxData[] testArray;
            LinkedList<TaxData> list;
            CreateTestData(10, out list, out testArray);

            int index = 0;
            foreach (TaxData taxData in list)
            {
                Assert.IsTrue(taxData.Equals(testArray[index]));
                index++;
            }
        }

        /// <summary>
        /// Tests LinkedList Sort() function and compares to array funcction
        /// </summary>
        [TestMethod]
        public void Sort_LinkedListArrayEquality_True()
        {
            TaxData[] testArray;
            LinkedList<TaxData> list;
            CreateTestData(10, out list, out testArray);

            list.Sort();
            testArray = SortArray(testArray);
            int index = 0;
            foreach (TaxData taxData in list)
            {
                Assert.IsTrue(taxData.Equals(testArray[index]));
                index++;
            }
        }

        /// <summary>
        /// Sorts TaxData[] object to compare to LinkedList object
        /// </summary>
        /// <param name="array">Unsorted object</param>
        /// <returns>sorted array</returns>
        public TaxData[] SortArray(TaxData[] array)
        {
            for (int i = 0; i < array.Length - 1; i++)
            {
                for (int j = 0; j < array.Length - 1 - i; j++)
                {
                    if(array[j].CompareTo(array[j+1]) > 0)
                    {
                        // SWAP
                        TaxData temp = array[j];
                        array[j] = array[j+1];
                        array[j+1] = temp;
                    }
                }
            }
            return array;
        }

        /// <summary>
        /// Creates test data with the same objects to compare while doing testsgggg
        /// </summary>
        /// <param name="size">amount of elements</param>
        /// <param name="linkedList">OUT Lab03 implementation of linked list</param>
        /// <param name="taxData">OUT Array</param>
        public void CreateTestData(int size, out LinkedList<TaxData> linkedList, out
TaxData[] taxData)
        {
            linkedList = new LinkedList<TaxData>();
            taxData = new TaxData[size];
            for (int i = 0; i < size; i++)
            {
                Random rng = new Random();
                TaxData temp = new TaxData(rng.Next(100).ToString(), i.ToString(),
(double)i/10);
                linkedList.Add(temp);
                taxData[i] = temp;
            }
        }

    }
}
```

Lab01Form.aspx:

```
<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="Lab01Form.aspx.cs"
Inherits="Lab02.Lab01Form" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <link rel="stylesheet" runat="server" media="screen" href="~/css/styles.css" />
    <title>Lab02 U16</title>
</head>
<body>
    <form id="form1" runat="server">
        <div id="body">
            <asp:Label ID="HeaderLabel" runat="server" Text="LAB02 U16"></asp:Label>
            <br />
            <br />
            <asp:Label ID="Label1" runat="server" Text="Tax Info U16a.txt:"></asp:Label>
            <br />
            <asp:FileUpload ID="FileUpload1" runat="server" />
            <br />
            <br />
            <asp:Label ID="Label2" runat="server" Text="Every Citizen Tax Data U16b.txt:
"></asp:Label>
            <br />
            <asp:FileUpload ID="FileUpload2" runat="server" />
            <br />
            <asp:Button ID="DataButton" runat="server" Text="Submit New Data"
OnClick="DataButton_Click" />
            <br />
            <br />
            <asp:Label ID="InitTaxLabel" runat="server" Text="U16a.txt Initial
data:"></asp:Label>
            <asp:Table ID="InitTaxTable" runat="server">
            </asp:Table>
            <br />
            <asp:Label ID="InitCitizenLabel" runat="server" Text="U16b.txt Initial
data:"></asp:Label>
            <asp:Table ID="InitCitizenTable" runat="server">
            </asp:Table>
            <br />
            <asp:Panel ID="CalculationsPanel" runat="server">
                <asp:Label ID="CitizenTaxLabel" runat="server" Text="All Citizen taxes
over the months"></asp:Label>
                <asp:Table ID="CitizenTaxTable" runat="server">
                </asp:Table>
                <br />
                <asp:Label ID="AverageTax" runat="server"></asp:Label>
                <br />
                <asp:Label ID="TotalTaxSum" runat="server"></asp:Label>
                <br />
                <br />
                <asp:Label ID="CitizenTaxLabel0" runat="server" Text="Above Average
Tax:"></asp:Label>
                <asp:Table ID="AboveAverageTable" runat="server">
                </asp:Table>
                <br />
                <asp:Label ID="FilterData" runat="server" Text="Filtered
data:"></asp:Label>
                <asp:Table ID="FilterTable" runat="server">
                </asp:Table>
                <br />
                Tax Code:<br />
                <asp:TextBox ID="TaxCodeTextBox" runat="server"></asp:TextBox>
                <br />
                Month:<br />
                <asp:TextBox ID="TaxMonthTextBox" runat="server"></asp:TextBox>
                <br />
                <asp:Button ID="ButtonFilter" runat="server" Text="Submit"
OnClick="ButtonFilter_Click" />
            </asp:Panel>
            <br />
        </div>
    </form>
</body>
</html>
```

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;

namespace Lab02
{
    public partial class Lab01Form : System.Web.UI.Page
    {
        private string taxDataInput = @"App_Data/U16a.txt";
        private string citizenDataInput = @"App_Data/U16b.txt";
        private string outputDataPath = @"App_Data/U16result.txt";
        protected void Page_Load(object sender, EventArgs e)
        {
            LinkedList<CitizenTaxData> citizenTaxData = null;
            LinkedList<TaxData> taxInfo = null;
            InOutUtils.CreateFile(Server.MapPath(outputDataPath));
            if (File.Exists(Server.MapPath(taxDataInput)))
            {
                taxInfo = InOutUtils.ReadTaxData(Server.MapPath(taxDataInput));
                InOutUtils.WriteTaxData(Server.MapPath(outputDataPath), taxInfo, "Initial
Tax Company Data:");
                FillTaxDataTable(taxInfo, InitTaxTable);
            }
            else
            {
                InitTaxLabel.Text = "";
            }

            if (File.Exists(Server.MapPath(citizenDataInput)))
            {
                citizenTaxData =
InOutUtils.ReadCitizenTaxData(Server.MapPath(citizenDataInput));
                //citizenTaxData.Sort(); Test
                InOutUtils.WriteCitizenTaxData(Server.MapPath(outputDataPath),
citizenTaxData, "Initial Citizen Tax Data:");
                FillCitizenTaxDataTable(citizenTaxData, InitCitizenTable);
            }
            else
            {
                InitCitizenLabel.Text = "";
            }

            if (citizenTaxData != null && taxInfo != null)
            {
                // Reads Initial Data and Outputs the Initial Data To WebForm and to text


                CitizenCalculations(taxInfo, citizenTaxData);
                CheckFiltered(taxInfo, citizenTaxData);
            }
            else
            {
                HeaderLabel.Text = "Plaese Upload remaining data files";
                CalculationsPanel.Visible = false;
            }
        }

        /// <summary>
        /// Does calculations from Tax and CitizenTax object
        /// </summary>
        /// <param name="taxInfo">Tax object</param>
        /// <param name="citizenTaxData">CitizenTax object</param>
        protected void CitizenCalculations(LinkedList<TaxData> taxInfo, 
LinkedList<CitizenTaxData> citizenTaxData)
        {
            LinkedList<CitizenData> citizensAverage = 
TaskUtils.CreateCitizenData(taxInfo, citizenTaxData); // For Above Average
            InOutUtils.WriteCitizenData(Server.MapPath(outputDataPath), citizensAverage, 
"Tax Sum of all citizens:");

            citizensAverage.Sort();
            InOutUtils.WriteCitizenData(Server.MapPath(outputDataPath), citizensAverage, 
"Tax Sum of all citizens SORTED A-Z:");
            FillCitizenTable(citizensAverage, CitizenTaxTable);

            double sum = TaskUtils.GetSum(citizensAverage);
            double average = TaskUtils.GetAverage(citizensAverage);
            InOutUtils.WriteHeader(Server.MapPath(outputDataPath), $"All Citizen TOTAL 
Tax Sum: {sum:f}");
            InOutUtils.WriteHeader(Server.MapPath(outputDataPath), $"Average Tax Sum: 
{average:f}");
            AverageTax.Text = $"Average tax per citizen: {average}";
            TotalTaxSum.Text = $"Total tax sum: {sum}";

            citizensAverage = TaskUtils.PayedAboveAverage(citizensAverage);
            InOutUtils.WriteCitizenData(Server.MapPath(outputDataPath), citizensAverage, 
"Citizens who paid above average:");
            FillCitizenTable(citizensAverage, AboveAverageTable);
        }
        /// <summary>
        /// Updates filtered data
        /// </summary>
        /// <param name="taxInfo">Tax Object</param>
        /// <param name="citizenTaxData">CitizenTax object</param>
        protected void CheckFiltered(LinkedList<TaxData> taxInfo, 
LinkedList<CitizenTaxData> citizenTaxData)
        {
            if (Session["TaxCode"] != null && Session["Month"] != null)
            {
                LinkedList<CitizenData> citizensFiltered = 
TaskUtils.CreateCitizenData(taxInfo, citizenTaxData); // For Filter
                citizensFiltered = TaskUtils.GetWhoPayedTaxes(citizensFiltered, 
Session["TaxCode"].ToString(), Session["Month"].ToString(), citizenTaxData);
                citizensFiltered.Sort();
                InOutUtils.WriteCitizenData(Server.MapPath(outputDataPath), 
citizensFiltered, $"Citizens who paid TaxCode: \"{Session["TaxCode"]}\" on Month: 
\"{Session["Month"]}\"");
                FillCitizenTable(citizensFiltered, FilterTable);
            }
            else
            {
                FilterData.Text = "No Filter provided";
                FilterTable.Visible = false;
            }

            Session["TaxCode"] = null;
            Session["Month"] = null;
        }

        /// <summary>
        /// Fills Table from CitizenTax object
        /// </summary>
        /// <param name="citizenTaxes">CitizenTaxData LinkedList</param>
        /// <param name="table">Table UI object</param>
        protected void FillCitizenTaxDataTable(LinkedList<CitizenTaxData> citizenTaxes,
Table table)
        {
            TableRow headerRow = new TableRow();
            headerRow.Cells.Add(CreateCell("Last Name"));
            headerRow.Cells.Add(CreateCell("First Name"));
            headerRow.Cells.Add(CreateCell("Address"));
            headerRow.Cells.Add(CreateCell("Month"));
            headerRow.Cells.Add(CreateCell("Tax Code"));
            headerRow.Cells.Add(CreateCell("Amount"));
            table.Rows.Add(headerRow);
            foreach (CitizenTaxData data in citizenTaxes)
            {
                table.Rows.Add(GetRow(data));
            }
        }

        /// <summary>
        /// Fills Table from Tax object
        /// </summary>
        /// <param name="taxes">LinkedList TaxData object</param>
        /// <param name="table">UI Table object</param>
        protected void FillTaxDataTable(LinkedList<TaxData> taxes, Table table)
        {
            TableRow headerRow = new TableRow();
            headerRow.Cells.Add(CreateCell("Tax Code"));
            headerRow.Cells.Add(CreateCell("Tax Company Name:"));
            headerRow.Cells.Add(CreateCell("Price:"));;
            table.Rows.Add(headerRow);
            foreach (TaxData data in taxes)
            {
                table.Rows.Add(GetRow(data));
            }
        }

        /// <summary>
        /// Fills citizen table
        /// </summary>
        /// <param name="citizens">Citizen object</param>
        /// <param name="table">UI.Table object</param>
        protected void FillCitizenTable(LinkedList<CitizenData> citizens, Table table)
        {
            TableRow headerRow = new TableRow();
            headerRow.Cells.Add(CreateCell("Last Name"));
            headerRow.Cells.Add(CreateCell("First Name"));
            headerRow.Cells.Add(CreateCell("Address"));
            headerRow.Cells.Add(CreateCell("Tax Sum"));
            table.Rows.Add(headerRow);
            foreach (CitizenData data in citizens)
            {
                table.Rows.Add(GetRow(data));
            }
        }

        protected void ButtonFilter_Click(object sender, EventArgs e)
        {
            string taxCode = TaxCodeTextBox.Text;
            string month = TaxMonthTextBox.Text;
            if (month != "" && taxCode != null)
```

```
    {
        Session["TaxCode"] = TaxCodeTextBox.Text;
        Session["Month"] = TaxMonthTextBox.Text;
    }
    Response.Redirect("Lab01Form.aspx");
}

protected void DataButton_Click(object sender, EventArgs e)
{
    if(FileUpload1.HasFile && FileUpload1.FileName.EndsWith(".txt"))
    {
        FileUpload1.SaveAs(Server.MapPath(taxDataInput));
    }
    if (FileUpload2.HasFile && FileUpload2.FileName.EndsWith(".txt"))
    {
        FileUpload2.SaveAs(Server.MapPath(citizenDataInput));
    }
    Response.Redirect("Lab01Form.aspx");
}

/// <summary>
/// Creates TableCell from text to speed up TableCell creation
/// </summary>
/// <param name="text">string text to add to the table cell</param>
/// <returns>TableCell class object</returns>
protected static TableCell CreateCell(string text)
{
    TableCell cell = new TableCell();
    cell.Text = text;
    return cell;
}

/// <summary>
/// Creates TableRow from TaxData object
/// </summary>
/// <param name="data">TaxData object</param>
/// <returns>TableRow object</returns>
public TableRow GetRow(TaxData data)
{
    TableRow row = new TableRow();
    row.Cells.Add(CreateCell(data.TaxCode));
    row.Cells.Add(CreateCell(data.TaxName));
    row.Cells.Add(CreateCell(data.Price.ToString()));
    return row;

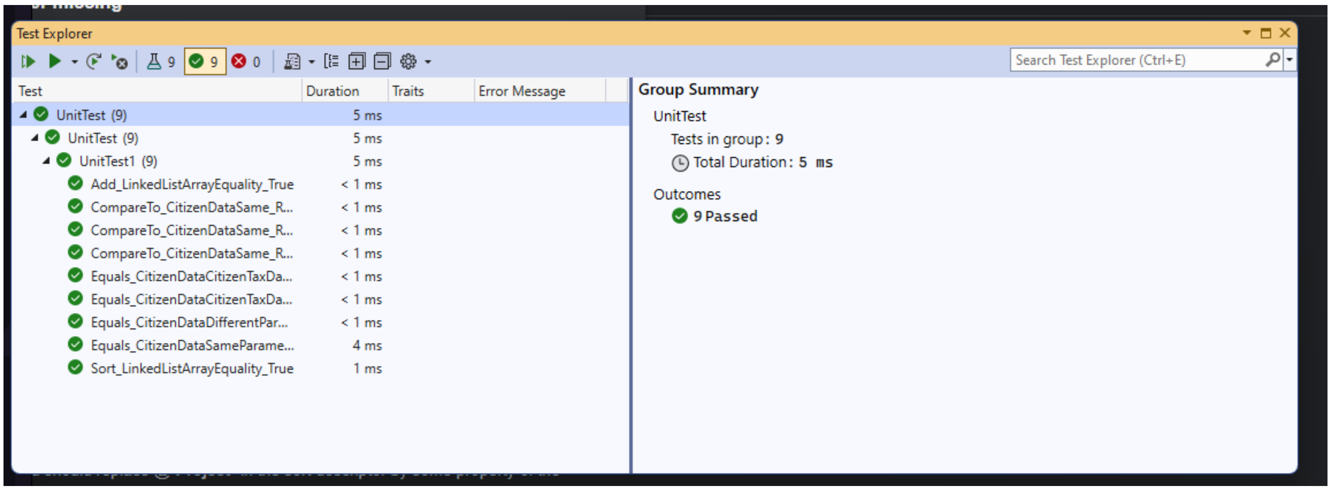
}

/// <summary>
/// Creates a row from CitizenTaxData
/// </summary>
/// <param name="data">CitizenTaxData class object</param>
/// <returns>TableRow object</returns>
public TableRow GetRow(CitizenTaxData data)
{
    TableRow row = new TableRow();
    row.Cells.Add(CreateCell(data.LastName));
    row.Cells.Add(CreateCell(data.FirstName));
    row.Cells.Add(CreateCell(data.Address));
    row.Cells.Add(CreateCell(data.Month));
    row.Cells.Add(CreateCell(data.TaxCode));
    row.Cells.Add(CreateCell(data.TaxAmount.ToString()));
    return row;
}
```

```
        /// <summary>
        /// Returns cictizen in TableRow format for the specified citizen
        /// </summary>
        /// <param name="data">data of the citizen</param>
        /// <returns>TableRow format of the specified citizen</returns>
        public TableRow GetRow(CitizenData data)
        {
            TableRow row = new TableRow();
            row.Cells.Add(CreateCell(data.LastName));
            row.Cells.Add(CreateCell(data.FirstName));
            row.Cells.Add(CreateCell(data.Address));
            row.Cells.Add(CreateCell(data.TaxSum.ToString()));
            return row;
        }
    }
}
```

## 3.7. Pradiniai duomenys ir rezultatai

Testavimo rezultatai:



Test Explorer

| Test | Duration | Traits | Error Message |
|---|---|---|---|
| UnitTest (9) | 5 ms | | |
| UnitTest (9) | 5 ms | | |
| UnitTest1 (9) | 5 ms | | |
| Add_LinkedListArrayEquality_True | < 1 ms | | |
| CompareTo_CitizenDataSame_R... | < 1 ms | | |
| CompareTo_CitizenDataSame_R... | < 1 ms | | |
| CompareTo_CitizenDataSame_R... | < 1 ms | | |
| Equals_CitizenDataCitizenTaxDa... | < 1 ms | | |
| Equals_CitizenDataCitizenTaxDa... | < 1 ms | | |
| Equals_CitizenDataDifferentPar... | < 1 ms | | |
| Equals_CitizenDataSameParame... | 4 ms | | |
| Sort_LinkedListArrayEquality_True | 1 ms | | |

Group Summary
UnitTest
Tests in group: 9
Total Duration: 5 ms
Outcomes
9 Passed

Pradiniai duomenys 1:

Tikslas – bendri įmonių kodų su skaičiais testavimo duomenys

U16a.txt:

```
11; Elektra; 0.12
21; Dujos; 0.58
31; Benzinas; 1.78
32; Diezelis; 1.90
```

Tikslas – bendri naudotojo testavimo duomenys

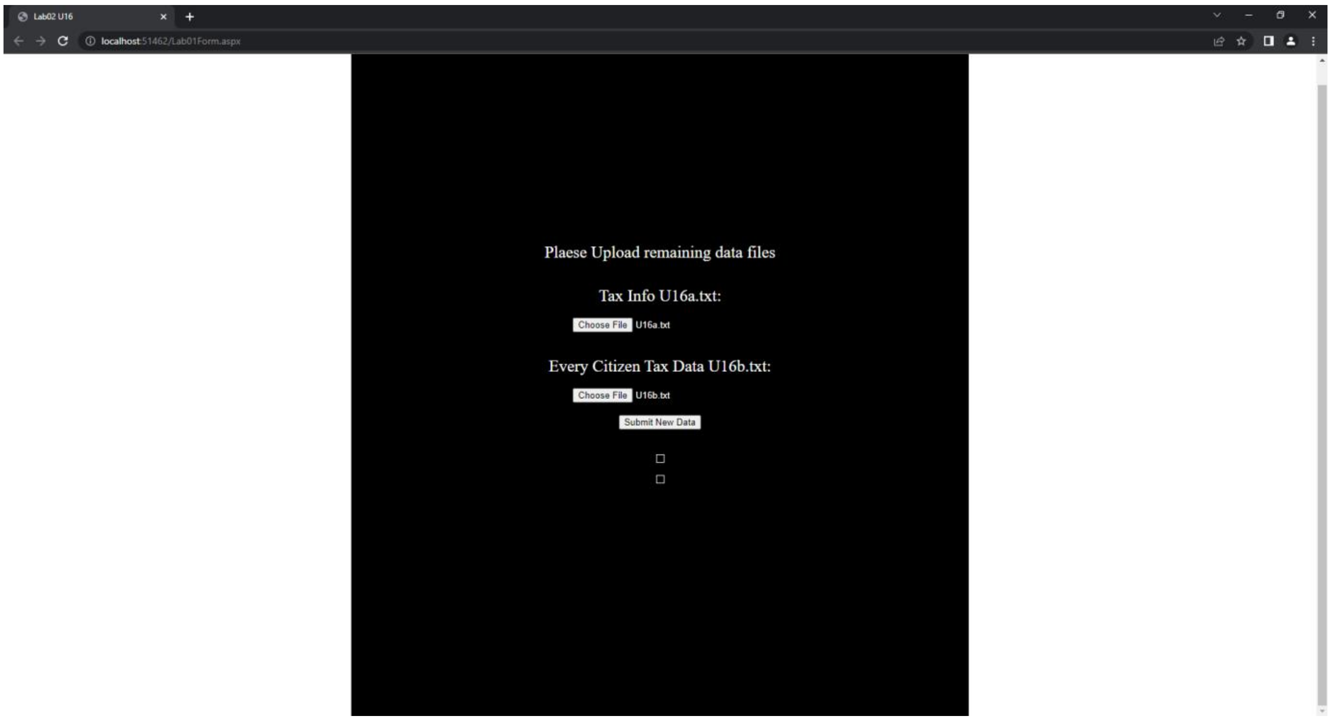
U16b.txt:

```
pavardė1; vardas1; adresas1;1;22;28;
pavardė1; vardas1; adresas1;5;22;20;
pavardė1; vardas1; adresas1;1;32;100;
pavardė1; vardas1; adresas1;2;32;97;
```

```
pavardė1; vardas1; adresas1;3;32;63;
pavardė1; vardas1; adresas1;2;22;25;
pavardė1; vardas1; adresas1;3;22;29;
pavardėAA; vardasAA; adresasAA;1;21;13;
pavardėAA; vardasAA; adresasAA;2;21;84;
pavardėAA; vardasAA; adresasAA;3;21;76;
pavardė1; vardas1; adresas1;4;22;39;
pavardė2; vardas2; adresas2;3;31;67;
pavardė2; vardas2; adresas2;4;31;98;
pavardė0; vardas2; adresas2;5;31;125;
pavardė0; vardas0; adresas3;1;11;31;
pavardė1; vardas1; adresas1;4;32;39;
pavardė1; vardas1; adresas1;5;32;20;
pavardė1; vardas1; adresas1;3;11;80;
pavardė1; vardas1; adresas1;4;11;39;
pavardė1; vardas1; adresas1;1;11;120;
pavardė1; vardas1; adresas1;2;11;100;
pavardė1; vardas1; adresas1;5;11;139;
pavardė2; vardas2; adresas2;1;31;31;
pavardė2; vardas2; adresas2;2;31;48;
pavardė0; vardas0; adresas3;2;11;48;
pavardė0; vardas0; adresas3;3;11;67;
pavardė0; vardas0; adresas3;4;11;98;
pavardė0; vardas0; adresas3;5;11;125;
pavardėAA; vardasAA; adresasAA;4;21;8;
pavardėAA; vardasAA; adresasAA;5;21;25;
```

Rezultatai 1:

Pradinė vartotojo sąsaja:



Plaese Upload remaining data files

Tax Info U16a.txt:

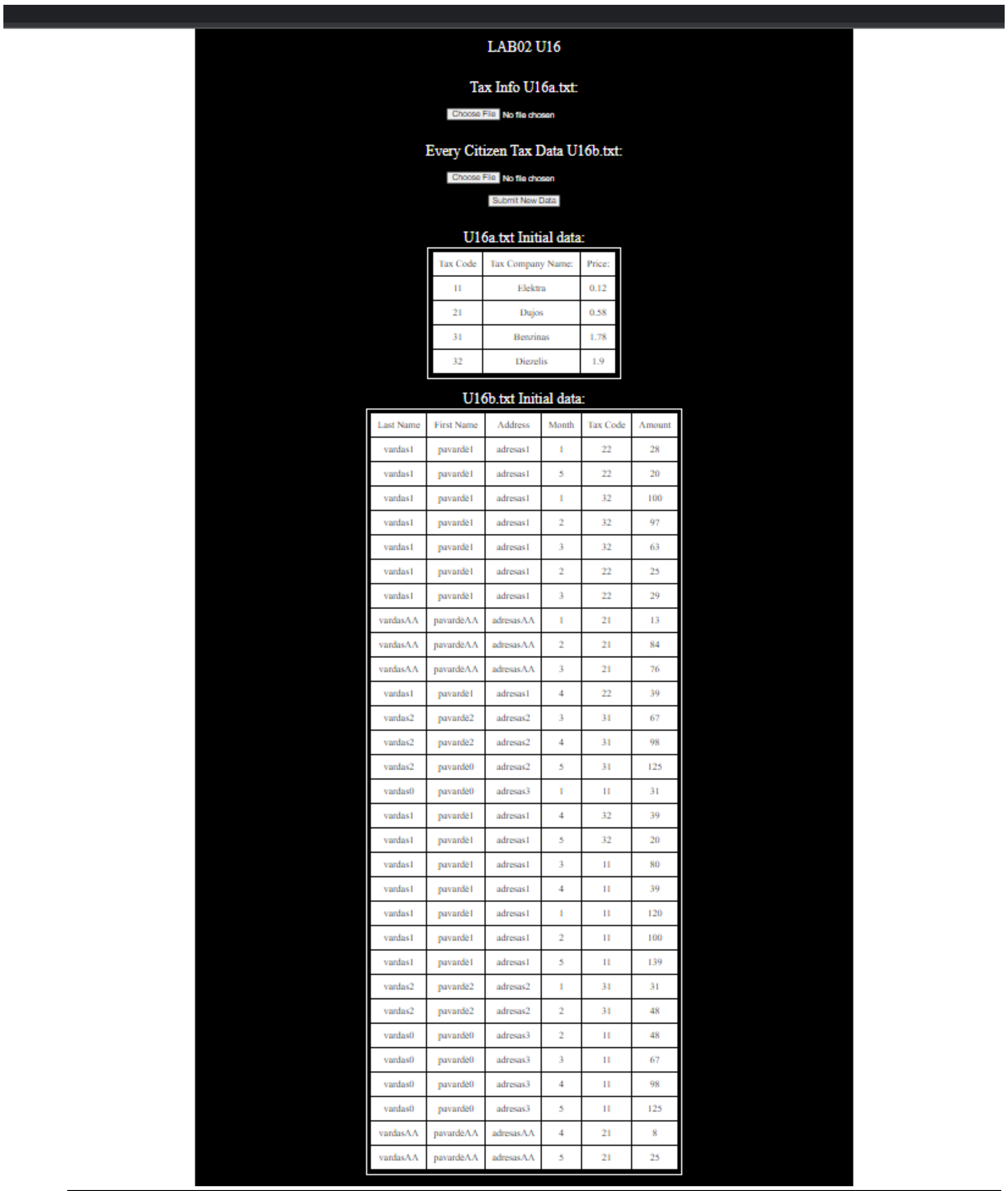
Choose File U16a.txt

Every Citizen Tax Data U16b.txt:

Choose File U16b.txt

Submit New Data

Įkeliam U16a.txt ir U16b.txt:



LAB02 U16

Tax Info U16a.txt:

Choose File No file chosen

Every Citizen Tax Data U16b.txt:

Choose File No file chosen

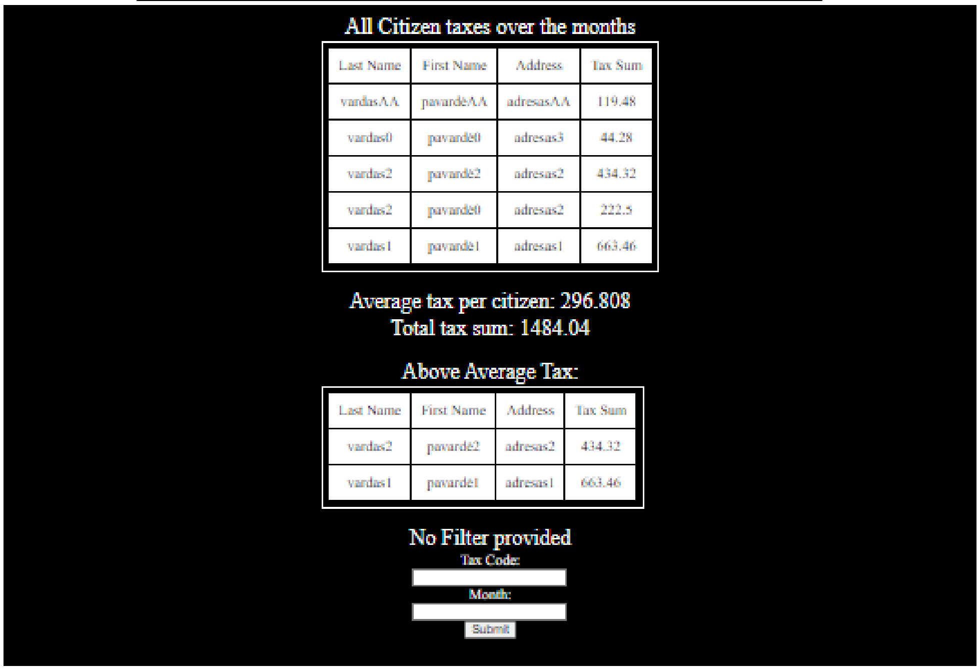
Submit New Data

U16a.txt Initial data:

| Tax Code | Tax Company Name: | Price: |
|---|---|---|
| 11 | Elektra | 0.12 |
| 21 | Dujos | 0.58 |
| 31 | Benzinas | 1.78 |
| 32 | Diezelis | 1.9 |

U16b.txt Initial data:

| Last Name | First Name | Address | Month | Tax Code | Amount |
|---|---|---|---|---|---|
| vardas1 | pavardė1 | adresas1 | 1 | 22 | 28 |
| vardas1 | pavardė1 | adresas1 | 5 | 22 | 20 |
| vardas1 | pavardė1 | adresas1 | 1 | 32 | 100 |
| vardas1 | pavardė1 | adresas1 | 2 | 32 | 97 |
| vardas1 | pavardė1 | adresas1 | 3 | 32 | 63 |
| vardas1 | pavardė1 | adresas1 | 2 | 22 | 25 |
| vardas1 | pavardė1 | adresas1 | 3 | 22 | 29 |
| vardasAA | pavardėAA | adresasAA | 1 | 21 | 13 |
| vardasAA | pavardėAA | adresasAA | 2 | 21 | 84 |
| vardasAA | pavardėAA | adresasAA | 3 | 21 | 76 |
| vardas1 | pavardė1 | adresas1 | 4 | 22 | 39 |
| vardas2 | pavardė2 | adresas2 | 3 | 31 | 67 |
| vardas2 | pavardė2 | adresas2 | 4 | 31 | 98 |
| vardas2 | pavardė0 | adresas2 | 5 | 31 | 125 |
| vardas0 | pavardė0 | adresas3 | 1 | 11 | 31 |
| vardas1 | pavardė1 | adresas1 | 4 | 32 | 39 |
| vardas1 | pavardė1 | adresas1 | 5 | 32 | 20 |
| vardas1 | pavardė1 | adresas1 | 3 | 11 | 80 |
| vardas1 | pavardė1 | adresas1 | 4 | 11 | 39 |
| vardas1 | pavardė1 | adresas1 | 1 | 11 | 120 |
| vardas1 | pavardė1 | adresas1 | 2 | 11 | 100 |
| vardas1 | pavardė1 | adresas1 | 5 | 11 | 139 |
| vardas2 | pavardė2 | adresas2 | 1 | 31 | 31 |
| vardas2 | pavardė2 | adresas2 | 2 | 31 | 48 |
| vardas0 | pavardė0 | adresas3 | 2 | 11 | 48 |
| vardas0 | pavardė0 | adresas3 | 3 | 11 | 67 |
| vardas0 | pavardė0 | adresas3 | 4 | 11 | 98 |
| vardas0 | pavardė0 | adresas3 | 5 | 11 | 125 |
| vardasAA | pavardėAA | adresasAA | 4 | 21 | 8 |
| vardasAA | pavardėAA | adresasAA | 5 | 21 | 25 |



All Citizen taxes over the months

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| vardasAA | pavardėAA | adresasAA | 119.48 |
| vardas0 | pavardė0 | adresas3 | 44.28 |
| vardas2 | pavardė2 | adresas2 | 434.32 |
| vardas2 | pavardė0 | adresas2 | 222.5 |
| vardas1 | pavardė1 | adresas1 | 663.46 |

Average tax per citizen: 296.808
Total tax sum: 1484.04

Above Average Tax:

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| vardas2 | pavardė2 | adresas2 | 434.32 |
| vardas1 | pavardė1 | adresas1 | 663.46 |

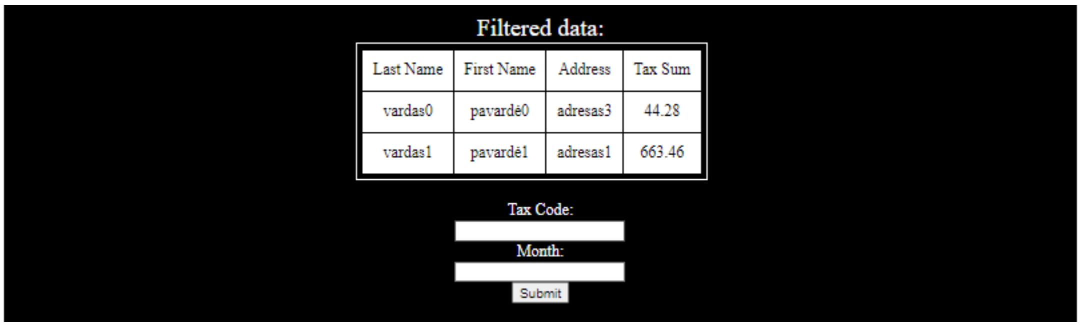
No Filter provided

Tax Code:

Month:

Submit

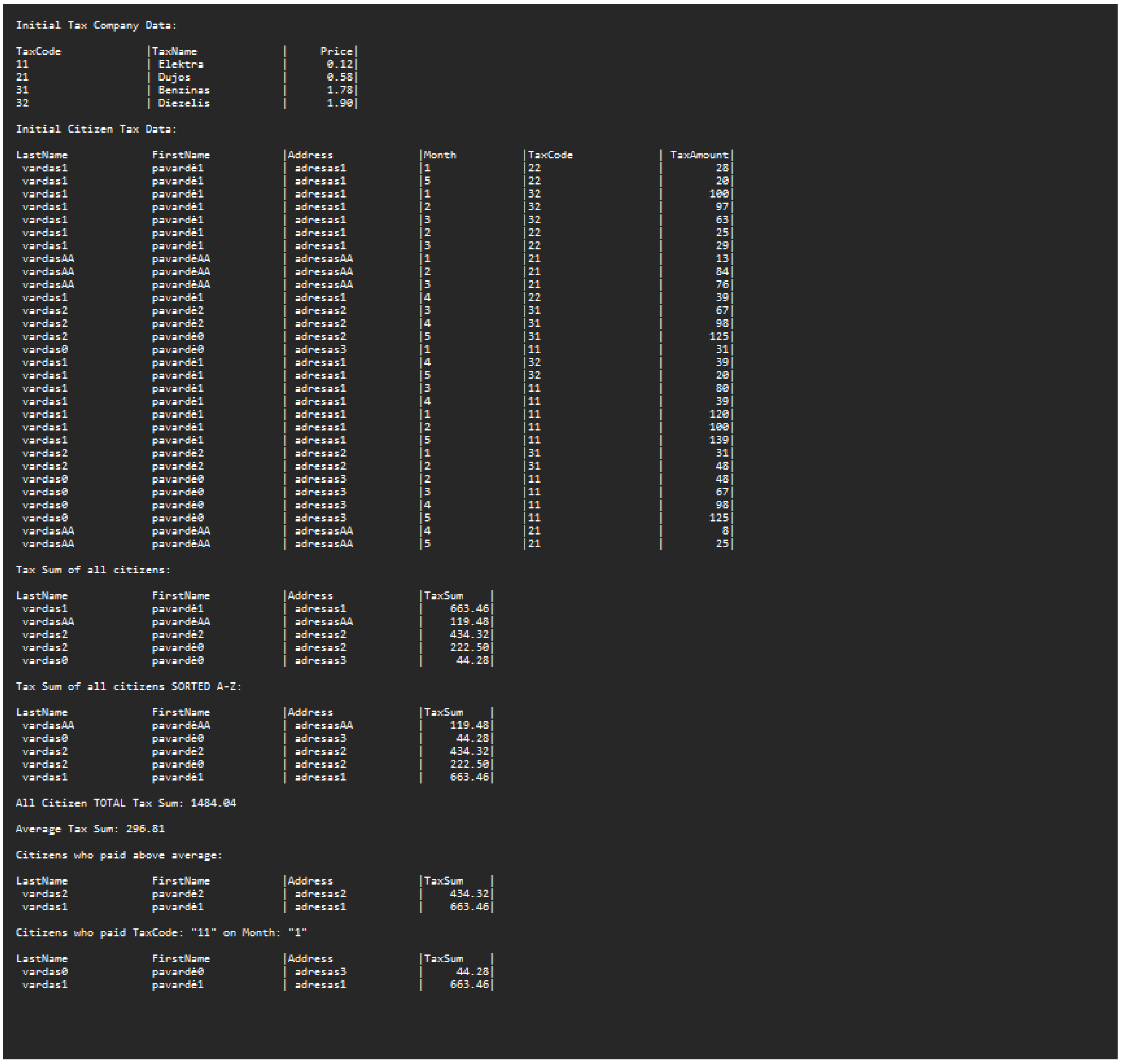
Filtruojame duomenis pagal TaxCode: 11, Month: 1:



**Filtered data:**

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| vardas0 | pavardė0 | adresas3 | 44.28 |
| vardas1 | pavardė1 | adresas1 | 663.46 |

U16result.txt:



```
Initial Tax Company Data:

TaxCode             |TaxName             |       Price|
11                  | Elektra            |        0.12|
21                  | Dujos              |        0.58|
31                  | Benzinas           |        1.78|
32                  | Diezelis           |        1.90|

Initial Citizen Tax Data:

LastName             FirstName           |Address             |Month           |TaxCode             |  TaxAmount|
 vardas1             pavardė1            | adresas1           |1               |22                  |         28|
 vardas1             pavardė1            | adresas1           |5               |22                  |         20|
 vardas1             pavardė1            | adresas1           |1               |32                  |        100|
 vardas1             pavardė1            | adresas1           |2               |32                  |         97|
 vardas1             pavardė1            | adresas1           |3               |32                  |         63|
 vardas1             pavardė1            | adresas1           |2               |22                  |         25|
 vardas1             pavardė1            | adresas1           |3               |22                  |         29|
 vardasAA            pavardėAA           | adresasAA          |1               |21                  |         13|
 vardasAA            pavardėAA           | adresasAA          |2               |21                  |         84|
 vardasAA            pavardėAA           | adresasAA          |3               |21                  |         76|
 vardas1             pavardė1            | adresas1           |4               |22                  |         39|
 vardas2             pavardė2            | adresas2           |3               |31                  |         67|
 vardas2             pavardė2            | adresas2           |4               |31                  |         98|
 vardas2             pavardė0            | adresas2           |5               |31                  |        125|
 vardas0             pavardė0            | adresas3           |1               |11                  |         31|
 vardas1             pavardė1            | adresas1           |4               |32                  |         39|
 vardas1             pavardė1            | adresas1           |5               |32                  |         20|
 vardas1             pavardė1            | adresas1           |3               |11                  |         80|
 vardas1             pavardė1            | adresas1           |4               |11                  |         39|
 vardas1             pavardė1            | adresas1           |1               |11                  |        120|
 vardas1             pavardė1            | adresas1           |2               |11                  |        100|
 vardas1             pavardė1            | adresas1           |5               |11                  |        139|
 vardas2             pavardė2            | adresas2           |1               |31                  |         31|
 vardas2             pavardė2            | adresas2           |2               |31                  |         48|
 vardas0             pavardė0            | adresas3           |2               |11                  |         48|
 vardas0             pavardė0            | adresas3           |3               |11                  |         67|
 vardas0             pavardė0            | adresas3           |4               |11                  |         98|
 vardas0             pavardė0            | adresas3           |5               |11                  |        125|
 vardasAA            pavardėAA           | adresasAA          |4               |21                  |          8|
 vardasAA            pavardėAA           | adresasAA          |5               |21                  |         25|

Tax Sum of all citizens:

LastName             FirstName           |Address             |TaxSum     |
 vardas1             pavardė1            | adresas1           |     663.46|
 vardasAA            pavardėAA           | adresasAA          |     119.48|
 vardas2             pavardė2            | adresas2           |     434.32|
 vardas2             pavardė0            | adresas2           |     222.50|
 vardas0             pavardė0            | adresas3           |      44.28|

Tax Sum of all citizens SORTED A-Z:

LastName             FirstName           |Address             |TaxSum     |
 vardasAA            pavardėAA           | adresasAA          |     119.48|
 vardas0             pavardė0            | adresas3           |      44.28|
 vardas2             pavardė2            | adresas2           |     434.32|
 vardas2             pavardė0            | adresas2           |     222.50|
 vardas1             pavardė1            | adresas1           |     663.46|

All Citizen TOTAL Tax Sum: 1484.04

Average Tax Sum: 296.81

Citizens who paid above average:

LastName             FirstName           |Address             |TaxSum     |
 vardas2             pavardė2            | adresas2           |     434.32|
 vardas1             pavardė1            | adresas1           |     663.46|

Citizens who paid TaxCode: "11" on Month: "1"

LastName             FirstName           |Address             |TaxSum     |
 vardas0             pavardė0            | adresas3           |      44.28|
 vardas1             pavardė1            | adresas1           |     663.46|
```

Pradiniai duomenys 2:

Tikslas – bendri įmonės testavimo duomenys su žodžiais

U16a.txt:

VAND; Vanduo; 0.07

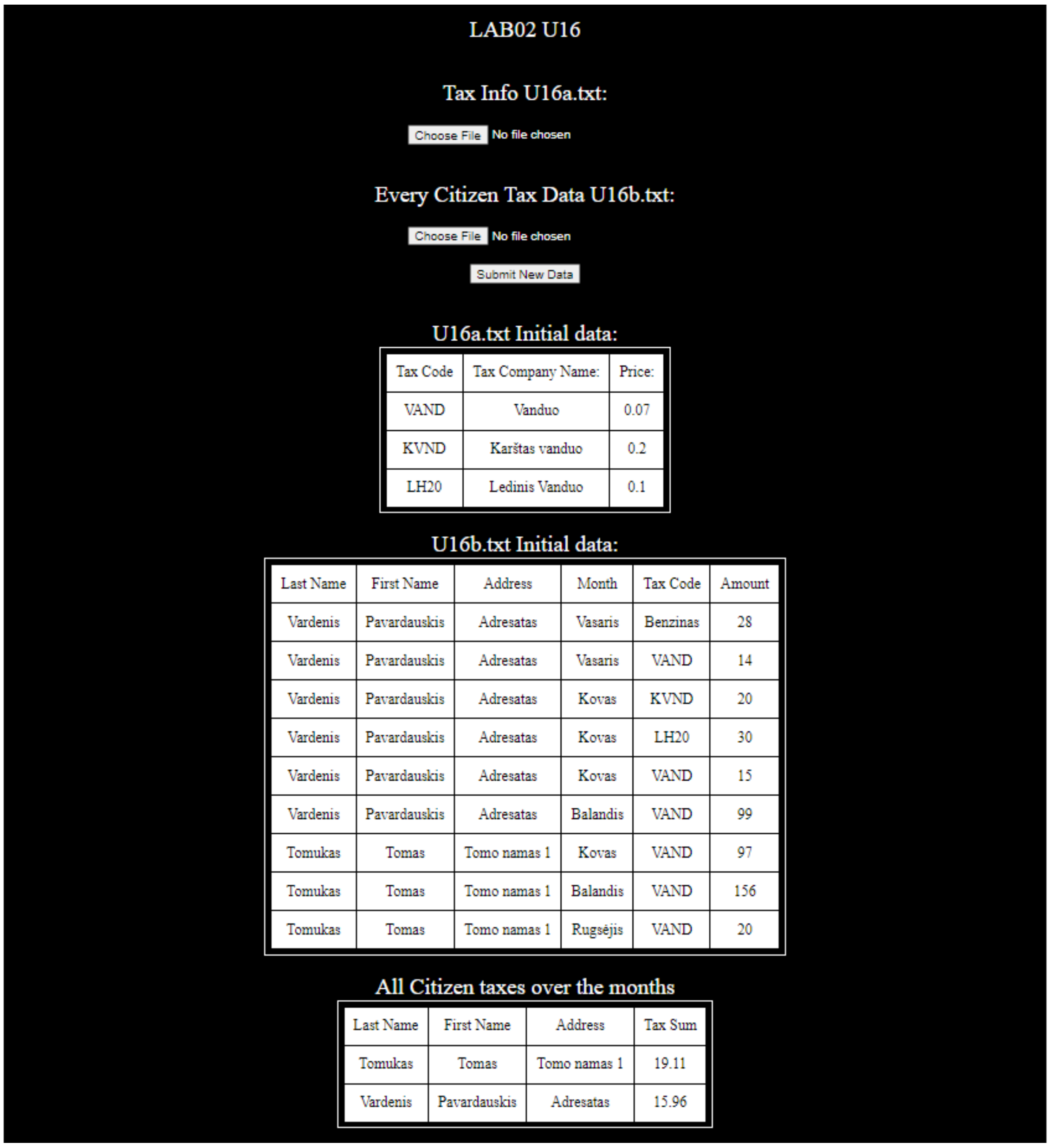
```
KVND; Karštas vanduo; 0.20
LH20; Ledinis Vanduo; 0.10
```

U16b.txt:

Tikslas – bendri žmonių testavimo duomenys su žodžiais

```
Pavardauskis; Vardenis; Adresatas;Vasaris;Benzinas;28;
Pavardauskis; Vardenis; Adresatas;Vasaris;VAND;14;
Pavardauskis; Vardenis; Adresatas;Kovas;KVND;20;
Pavardauskis; Vardenis; Adresatas;Kovas;LH20;30;
Pavardauskis; Vardenis; Adresatas;Kovas;VAND;15;
Pavardauskis; Vardenis; Adresatas;Balandis;VAND;99;
Tomas; Tomukas; Tomo namas 1;Kovas;VAND;97;
Tomas; Tomukas; Tomo namas 1;Balandis;VAND;156;
Tomas; Tomukas; Tomo namas 1;Rugsėjis;VAND;20;
```

Rezultatai 2:
Vartotojo sąsaja:
Naudojant filtrus: TaxCode: Vand, Month: Kovas



LAB02 U16

Tax Info U16a.txt:

Choose File No file chosen

Every Citizen Tax Data U16b.txt:

Choose File No file chosen

Submit New Data

U16a.txt Initial data:

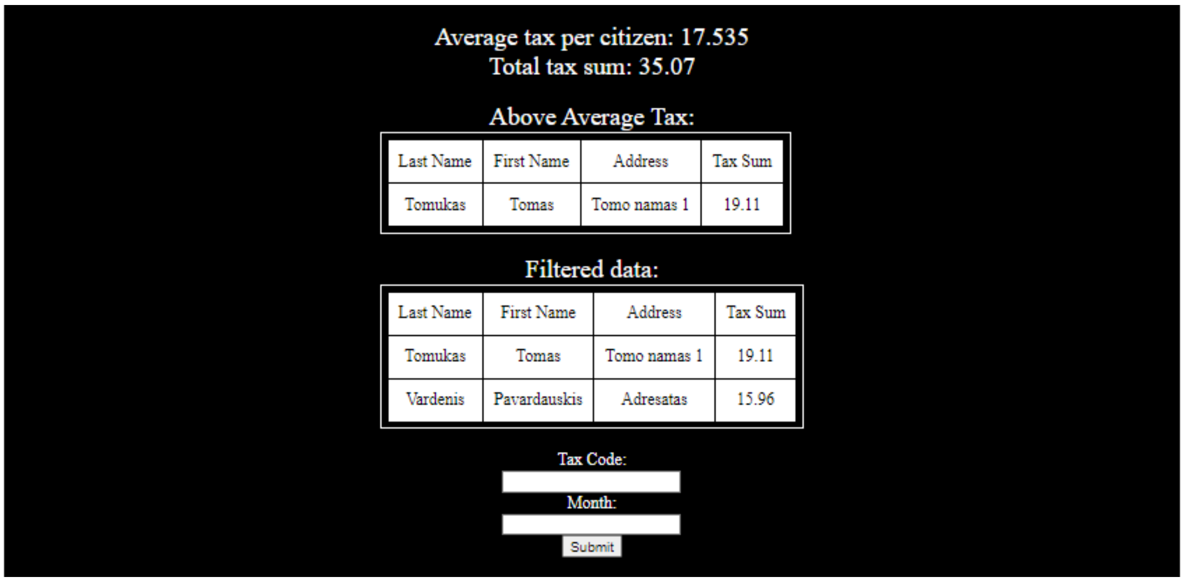
| Tax Code | Tax Company Name: | Price: |
|---|---|---|
| VAND | Vanduo | 0.07 |
| KVND | Karštas vanduo | 0.2 |
| LH20 | Ledinis Vanduo | 0.1 |

U16b.txt Initial data:

| Last Name | First Name | Address | Month | Tax Code | Amount |
|---|---|---|---|---|---|
| Vardenis | Pavardauskis | Adresatas | Vasaris | Benzinas | 28 |
| Vardenis | Pavardauskis | Adresatas | Vasaris | VAND | 14 |
| Vardenis | Pavardauskis | Adresatas | Kovas | KVND | 20 |
| Vardenis | Pavardauskis | Adresatas | Kovas | LH20 | 30 |
| Vardenis | Pavardauskis | Adresatas | Kovas | VAND | 15 |
| Vardenis | Pavardauskis | Adresatas | Balandis | VAND | 99 |
| Tomukas | Tomas | Tomo namas 1 | Kovas | VAND | 97 |
| Tomukas | Tomas | Tomo namas 1 | Balandis | VAND | 156 |
| Tomukas | Tomas | Tomo namas 1 | Rugsėjis | VAND | 20 |

All Citizen taxes over the months

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| Tomukas | Tomas | Tomo namas 1 | 19.11 |
| Vardenis | Pavardauskis | Adresatas | 15.96 |



Average tax per citizen: 17.535
Total tax sum: 35.07

Above Average Tax:

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| Tomukas | Tomas | Tomo namas 1 | 19.11 |

Filtered data:

| Last Name | First Name | Address | Tax Sum |
|---|---|---|---|
| Tomukas | Tomas | Tomo namas 1 | 19.11 |
| Vardenis | Pavardauskis | Adresatas | 15.96 |

U16Result.txt:

```
Initial Tax Company Data:

TaxCode             |TaxName             |      Price|
VAND                | Vanduo             |       0.07|
KVND                | Karštas vanduo     |       0.20|
LH20                | Ledinis Vanduo     |       0.10|

Initial Citizen Tax Data:

LastName            FirstName           |Address            |Month          |TaxCode             | TaxAmount|
 Vardenis           Pavardauskis        | Adresatas         |Vasaris        |Benzinas            |        28|
 Vardenis           Pavardauskis        | Adresatas         |Vasaris        |VAND                |        14|
 Vardenis           Pavardauskis        | Adresatas         |Kovas          |KVND                |        20|
 Vardenis           Pavardauskis        | Adresatas         |Kovas          |LH20                |        30|
 Vardenis           Pavardauskis        | Adresatas         |Kovas          |VAND                |        15|
 Vardenis           Pavardauskis        | Adresatas         |Balandis       |VAND                |        99|
 Tomukas            Tomas               | Tomo namas 1      |Kovas          |VAND                |        97|
 Tomukas            Tomas               | Tomo namas 1      |Balandis       |VAND                |       156|
 Tomukas            Tomas               | Tomo namas 1      |Rugsėjis       |VAND                |        20|

Tax Sum of all citizens:|

LastName            FirstName           |Address            |TaxSum    |
 Vardenis           Pavardauskis        | Adresatas         |     15.96|
 Tomukas            Tomas               | Tomo namas 1      |     19.11|

Tax Sum of all citizens SORTED A-Z:

LastName            FirstName           |Address            |TaxSum    |
 Tomukas            Tomas               | Tomo namas 1      |     19.11|
 Vardenis           Pavardauskis        | Adresatas         |     15.96|

All Citizen TOTAL Tax Sum: 35.07

Average Tax Sum: 17.54

Citizens who paid above average:

LastName            FirstName           |Address            |TaxSum    |
 Tomukas            Tomas               | Tomo namas 1      |     19.11|

Citizens who paid TaxCode: "VAND" on Month: "Kovas"

LastName            FirstName           |Address            |TaxSum    |
 Tomukas            Tomas               | Tomo namas 1      |     19.11|
 Vardenis           Pavardauskis        | Adresatas         |     15.96|
```

css/styles.css:

```
body {
    color: white;
    background: white;
    padding: 0;
    margin: 0;
    display: flex;
    justify-content: center;
}

#body {
    display: flex;
    flex-direction: column;
    justify-content: center;
    align-items: center;
    text-align: center;
    padding: 15px 280px;
    background-color: black;
    min-height:100vh;
}

td {
    background-color: white;
}

table {
    border: 1px solid;
    border-color:white;
    padding: 5px;
}

td {
    color: black;
    padding:10px;
}

span {
    font-size: 1.5em;
}
```

Lab01Form.aspx:

## 3.8. Dėstytojo pastabos

Ačiū, puikus darbas, tik:

1. Testiniai variantai neturi tikslų.
2. Vienetų testavimas yra minimalus.
3. Vienetų testavimo rezultatai nėra įtraukti į ataskaitą.

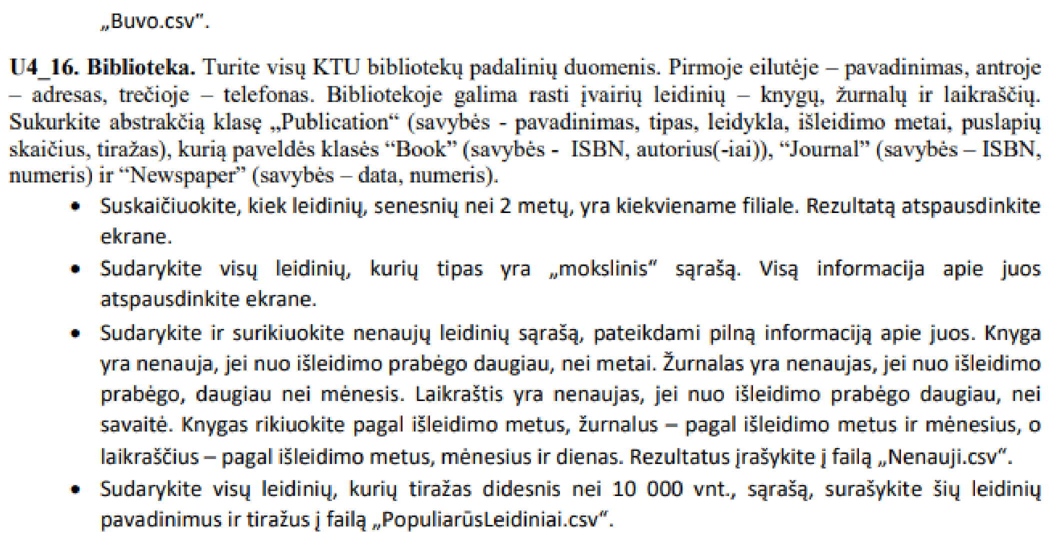
Laboratorinio įvertinimas: 7

Testo taškai: 2

Bendras: 9

## 4. Polimorfizmas ir išimčių valdymas (L4)

### 4.1. Darbo užduotis

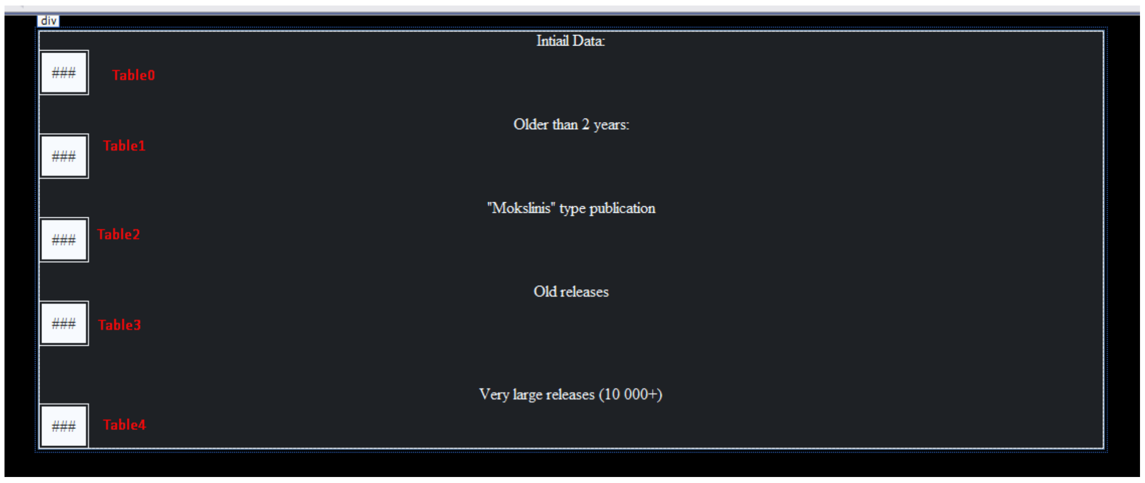


„Buvo.csv".

**U4_16. Biblioteka.** Turite visų KTU bibliotekų padalinių duomenis. Pirmoje eilutėje – pavadinimas, antroje – adresas, trečioje – telefonas. Bibliotekoje galima rasti įvairių leidinių – knygų, žurnalų ir laikraščių. Sukurkite abstrakčią klasę „Publication“ (savybės - pavadinimas, tipas, leidykla, išleidimo metai, puslapių skaičius, tiražas), kurią paveldės klasės “Book” (savybės - ISBN, autorius(-iai)), “Journal” (savybės – ISBN, numeris) ir “Newspaper” (savybės – data, numeris).

- Suskaičiuokite, kiek leidinių, senesnių nei 2 metų, yra kiekviename filiale. Rezultatą atspausdinkite ekrane.
- Sudarykite visų leidinių, kurių tipas yra „mokslinis“ sąrašą. Visą informacija apie juos atspausdinkite ekrane.
- Sudarykite ir surikiuokite nenaujų leidinių sąrašą, pateikdami pilną informaciją apie juos. Knyga yra nenauja, jei nuo išleidimo prabėgo daugiau, nei metai. Žurnalas yra nenaujas, jei nuo išleidimo prabėgo, daugiau nei mėnesis. Laikraštis yra nenaujas, jei nuo išleidimo prabėgo daugiau, nei savaitė. Knygas rikiuokite pagal išleidimo metus, žurnalus – pagal išleidimo metus ir mėnesius, o laikraščius – pagal išleidimo metus, mėnesius ir dienas. Rezultatus įrašykite į failą „Nenauji.csv“.
- Sudarykite visų leidinių, kurių tiražas didesnis nei 10 000 vnt., sąrašą, surašykite šių leidinių pavadinimus ir tiražus į failą „PopuliarūsLeidiniai.csv“.

### 4.2. Grafinės vartotojo sąsajos schema

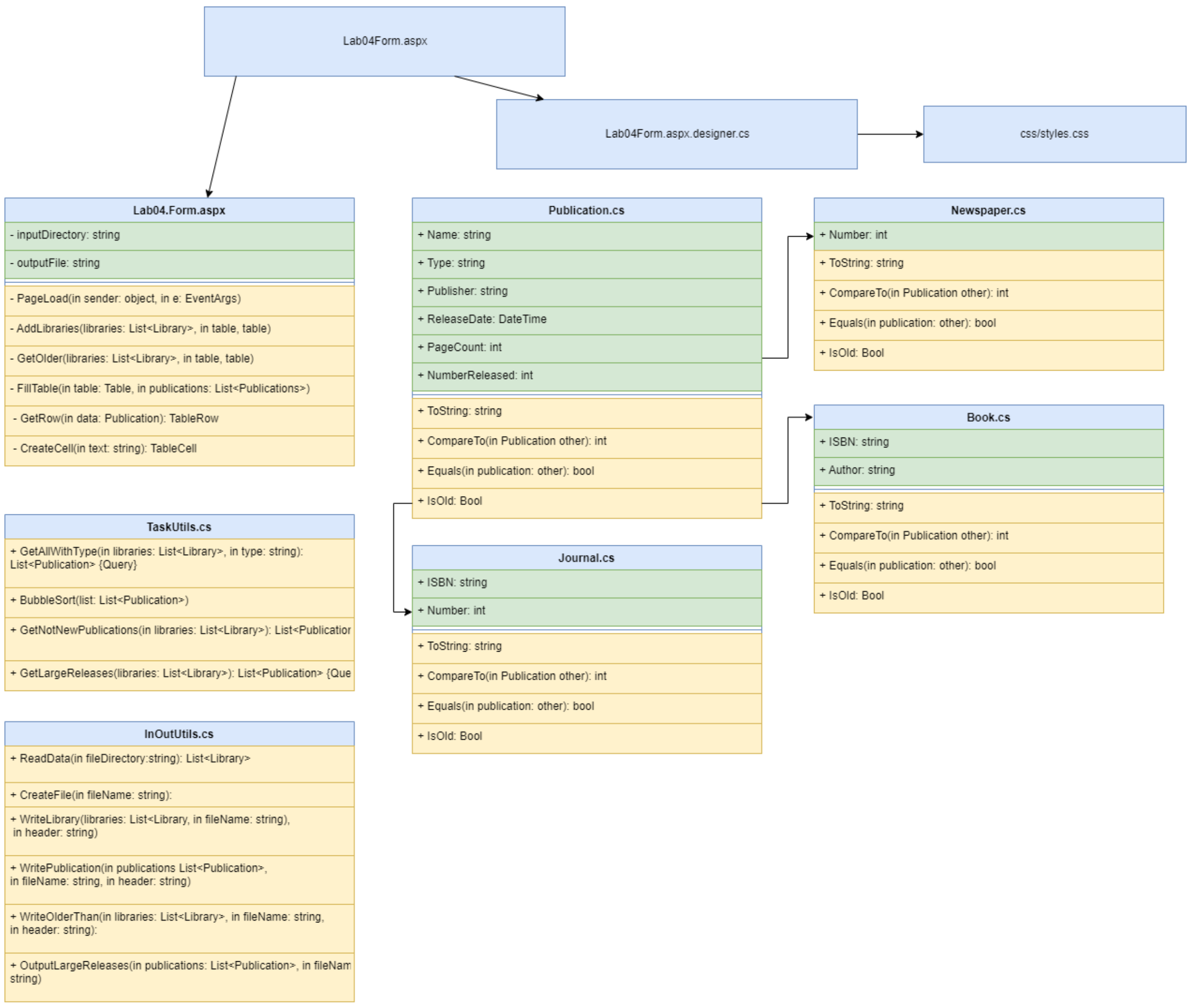


### 4.3. Sąsajoje panaudotų komponentų keičiamos savybės

| Komponentas | Savybė | Reikšmė |
|---|---|---|
| | | |
| | | |
| | | |

Sąsajoje nebuvo panaudotų komponentų savybės keičiamos. Duomenys yra tekstas arba table su automatiškai generuotais IDs dėl to nieko nebuvo keičiama.

## 4.4. Klasių diagrama



Lab04Form.aspx
Lab04Form.aspx.designer.cs
css/styles.css
Lab04.Form.aspx
- inputDirectory: string
- outputFile: string
- PageLoad(in sender: object, in e: EventArgs)
- AddLibraries(libraries: List<Library>, in table, table)
- GetOlder(libraries: List<Library>, in table, table)
- FillTable(in table: Table, in publications: List<Publications>)
- GetRow(in data: Publication): TableRow
- CreateCell(in text: string): TableCell
Publication.cs
+ Name: string
+ Type: string
+ Publisher: string
+ ReleaseDate: DateTime
+ PageCount: int
+ NumberReleased: int
+ ToString: string
+ CompareTo(in Publication other): int
+ Equals(in publication: other): bool
+ IsOld: Bool
Newspaper.cs
+ Number: int
+ ToString: string
+ CompareTo(in Publication other): int
+ Equals(in publication: other): bool
+ IsOld: Bool
Book.cs
+ ISBN: string
+ Author: string
+ ToString: string
+ CompareTo(in Publication other): int
+ Equals(in publication: other): bool
+ IsOld: Bool
TaskUtils.cs
+ GetAllWithType(in libraries: List<Library>, in type: string): List<Publication> {Query}
+ BubbleSort(list: List<Publication>)
+ GetNotNewPublications(in libraries: List<Library>): List<Publicatior
+ GetLargeReleases(libraries: List<Library>): List<Publication> {Que
Journal.cs
+ ISBN: string
+ Number: int
+ ToString: string
+ CompareTo(in Publication other): int
+ Equals(in publication: other): bool
+ IsOld: Bool
InOutUtils.cs
+ ReadData(in fileDirectory:string): List<Library>
+ CreateFile(in fileName: string):
+ WriteLibrary(libraries: List<Library, in fileName: string), in header: string)
+ WritePublication(in publications List<Publication>, in fileName: string, in header: string)
+ WriteOlderThan(in libraries: List<Library>, in fileName: string, in header: string):
+ OutputLargeReleases(in publications: List<Publication>, in fileNam string)

## 4.5. Programos vartotojo vadovas

Programa įjungiama. Užkrauną visus duomenų failus rastus App_Data/Data folderyję ir parodo vartotojui.

## 4.6. Programos tekstas

Publication.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
```

```
namespace Lab04
{
    public abstract class Publication : IComparable<Publication>, IEquatable<Publication>
    {
        public string Name { get; set; }
        public string Type { get; set; }
        public string Publisher { get; set; }
        public DateTime ReleaseDate { get; set; }
        public int PageCount { get; set; }
        public int NumberReleased { get; set; }

        /// <summary>
        /// Custructor
        /// </summary>
        /// <param name="name"> Name of the Publication </param>
        /// <param name="type"> Type of the Publication </param>
        /// <param name="publisher"> Publisher of the publication </param>
        /// <param name="realeseYear"> Year in which the publication was released
</param>
        /// <param name="pageCount"> Page Count </param>
        /// <param name="numberReleased"> Number of publications released</param>
        public Publication(string name, string type, string publisher, DateTime
releaseDate, int pageCount, int numberReleased)
        {
            Name = name;
            Type = type;
            Publisher = publisher;
            ReleaseDate = releaseDate;
            PageCount = pageCount;
            NumberReleased = numberReleased;
        }

        public override string ToString()
        {
            return $"{Name,-25} |{Type,-15} |{Publisher,-25} |{ReleaseDate,-20}
|{PageCount,10} |{NumberReleased,15} |";
        }

        /// <summary>
        /// CompareTo Implementation
        /// </summary>
        /// <param name="other"> Other object to compare to</param>
        /// <returns>integer</returns>
        public virtual int CompareTo(Publication other)
        {
            return ReleaseDate.CompareTo(other.ReleaseDate);
        }

        /// <summary>
        /// Equals Override
        /// </summary>
        /// <param name="other"> Other Publication to compare to</param>
        /// <returns> Boolean </returns>
        public virtual bool Equals(Publication other)
        {
            return Name == other.Name;
        }

        /// <summary>
        /// IsOld Function. Checks if the publication is old
        /// </summary>
        public virtual bool IsOld()
        {
            if(DateTime.Now.AddYears(-1).CompareTo(ReleaseDate) < 0)
                return true;
            return false;
        }

    }
}
```

Book.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab04
{
    public class Book : Publication, IComparable<Publication>, IEquatable<Publication>
    {
        public Book(string name, string type, string publisher, DateTime releaseDate, int
pageCount, int numberReleased, string isbn, string author) : base(name, type, publisher,
releaseDate, pageCount, numberReleased)
        {
            ISBN = isbn;
            Author = author;
        }

        public string ISBN { get; set; }
        public string Author { get; set; }

        /// <summary>
        /// To String Implementation
        /// </summary>
        /// <returns> string </returns>
        public override string ToString()
        {
            return base.ToString() + $"{ISBN,-15} |{Author,-20}";
        }

        /// <summary>
        /// CompareTo override
        /// </summary>
        /// <param name="other">  Other Publication to compare to </param>
        /// <returns> Publication </returns>
        public override int CompareTo(Publication other)
        {
            int comparison = ReleaseDate.Year.CompareTo(other.ReleaseDate.Year);
            return comparison;
        }

        /// <summary>
        /// iEquatable override
        /// </summary>
        /// <param name="other"> Other Publication to compare to</param>
        /// <returns> Bool </returns>
        public override bool Equals(Publication other)
        {
            return Name == other.Name;
        }

        /// <summary>
        /// IsOld Function. Checks if the publication is old
        /// </summary>
        public override bool IsOld()
        {
            if (DateTime.Now.AddYears(-1).CompareTo(ReleaseDate) > 0)
                return true;
            return false;
        }
    }
}
```

Journal.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab04
{
    public class Journal : Publication, IComparable<Publication>, IEquatable<Publication>
    {
        public Journal(string name, string type, string publisher, DateTime releaseDate,
int pageCount, int numberReleased, string isbn, int number) : base(name, type, publisher,
releaseDate, pageCount, numberReleased)
        {
            ISBN = isbn;
            Number = number;
        }

        public string ISBN { get; set; }

        public int Number { get; set; }

        /// <summary>
        /// To String Implementation
        /// </summary>
        /// <returns> string </returns>
        public override string ToString()
        {
            return base.ToString() + $"{ISBN,-15} |{Number,20}";
        }

        /// <summary>
        /// CompareTo override
        /// </summary>
        /// <param name="other">  Other Publication to compare to </param>
        /// <returns> Publication </returns>
        public override int CompareTo(Publication other)
        {
            int comparison = ReleaseDate.Year.CompareTo(other.ReleaseDate.Year);
            return comparison;
        }

        /// <summary>
        /// iEquatable override
        /// </summary>
        /// <param name="other"> Other Publication to compare to</param>
        /// <returns> Bool </returns>
        public override bool Equals(Publication other)
        {
            return Name == other.Name;
        }

        /// <summary>
        /// IsOld Function. Checks if the publication is old
        /// </summary>
        public override bool IsOld()
        {
            if (DateTime.Now.AddDays(-30).CompareTo(ReleaseDate) < 0)
                return true;
            return false;
        }
    }
}
```

Newspaper.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab04.App_Code
{
    public class Newspaper : Publication, IComparable<Publication>,
IEquatable<Publication>
    {
        public Newspaper(string name, string type, string publisher, DateTime
releaseDate, int pageCount, int numberReleased, int number) : base(name, type, publisher,
releaseDate, pageCount, numberReleased)
        {
            Number = number;
        }
        public int Number { get; set; }

        /// <summary>
        /// To String Implementation
        /// </summary>
        /// <returns> string </returns>
        public override string ToString()
        {
            return base.ToString() + $"{Number,15} |";
        }

        /// <summary>
        /// CompareTo override
        /// </summary>
        /// <param name="other">  Other Publication to compare to </param>
        /// <returns> Publication </returns>
        public override int CompareTo(Publication other)
        {
            int comparison = ReleaseDate.Year.CompareTo(other.ReleaseDate.Year);
            if (comparison != 0)
            {
                comparison = ReleaseDate.Month.CompareTo(other.ReleaseDate.Month);
            }
            return comparison;
        }

        /// <summary>
        /// iEquatable override
        /// </summary>
        /// <param name="other"> Other Publication to compare to</param>
        /// <returns> Bool </returns>
        public override bool Equals(Publication other)
        {
            return Name == other.Name;
        }

        /// <summary>
        /// IsOld Function. Checks if the publication is old
        /// </summary>
        public override bool IsOld()
        {
            if (DateTime.Now.AddDays(-7).CompareTo(ReleaseDate) > 0)
```

```
                return true;
            return false;
        }
    }
}
```

Library.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab04.App_Code
{
    public class Library
    {
        public string Name { get; set; }
        public string Address { get; set; }
        public string PhoneNumber { get; set; }

        private List<Publication> publications;

        public int Count { get { return publications.Count;  } }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="name"> Name of the library</param>
        /// <param name="adress"> Adress of the library</param>
        /// <param name="phoneNumber"></param>
        public Library(string name, string address, string phoneNumber)
        {
            Name = name;
            Address = address;
            PhoneNumber = phoneNumber;
            publications = new List<Publication>();
        }

        /// <summary>
        /// Adds a publication
        /// </summary>
        /// <param name="publication"> Publication Data Type</param>
        public void Add(Publication publication)
        {
            publications.Add(publication);
        }

        /// <summary>
        /// Returns Items with selected index. If out of bounds error is thrown, returns
null-
        /// </summary>
        /// <param name="index"> index of the item to return</param>
        /// <returns></returns>
        public Publication Get(int index)
        {
            try
            {
                return publications[index];
            }
            catch
            {
                return null;
            }
        }
        /// <summary>
        /// Gets The count of publications older than specified num ber
        /// </summary>
        /// <param name="year"> Years to check for older count</param>
        /// <returns> Older Count</returns>
        /// <exception cref="Exception"> Failed to compare the objects, Publication type
error</exception>
        public int OlderThanCount(int year)
        {
            int count = 0;
            try
            {
                foreach (Publication publication in publications)
                {
                    if (publication.ReleaseDate.CompareTo(DateTime.Now.AddYears(-year)) <
0)
                    {
                        count++;
                    }
                }
            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }

            return count;
        }
    }
}
```

TaskUtils.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab04.App_Code
{
    public static class TaskUtils
    {
        /// <summary>
        /// Gets all Publications with specified Typer
        /// </summary>
        /// <param name="libraries"> List Library class object</param>
        /// <param name="type"> string, type of the object</param>
        /// <returns></returns>
        public static List<Publication> GetAllWithType(List<Library> libraries, string
type)
        {
            List<Publication> list = new List<Publication>();

            try
            {
                foreach (Library library in libraries)
                {
                    for (int i = 0; i < library.Count; i++)
                    {
                        Publication publication = library.Get(i);
                        if(publication.Type == type)
                            list.Add(publication);
                    }
                }
            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }

            return list;
        }

        public static void BubbleSort( this List<Publication> list)
        {
            for (int i = 0; i < list.Count - 1; i++)
            {
                for (int j = 0; j < list.Count - 1 - i; j++)
                {
                    if(list[j].CompareTo(list[j]) < 0)
                    {
                        Publication temp = list[j];
                        list[j] = list[j + 1];
                        list[j + 1] = temp;
                    }
                }
            }
        }

        /// <summary>
        /// Gets Not New Publications
        /// </summary>
        /// <param name="libraries"> All Library datas</param>
        /// <returns> List Publications of not new publicaitopns</returns>
        /// <exception cref="Exception"></exception>
        public static List<Publication> GetNotNewPublications(List<Library> libraries)
        {
            List<Publication> list = new List<Publication>();

            try
            {
                foreach (Library library in libraries)
                {
                    for (int i = 0; i < library.Count; i++)
                    {
                        Publication publication = library.Get(i);
                        if(publication.IsOld())
                        {
                            list.Add(publication);
                        }
                    }
                }
            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }

            return list;
        }

        /// <summary>
        /// Gets LargeReleases
        /// </summary>
        /// <param name="libraries"> All Libraries to check data for</param>
        /// <returns></returns>
        /// <exception cref="Exception"></exception>
        public static List<Publication> GetLargeReleases(List<Library> libraries)
        {
            List<Publication> list = new List<Publication>();
            try
            {
                foreach (Library library in libraries)
                {
                    for (int i = 0; i < library.Count; i++)
                    {
                        Publication pub = library.Get(i);
                        if(pub.NumberReleased >= 10000)
                            list.Add(pub);
                    }
                }
            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }

            return list;
        }
    }
}
```

InOutUtils.cs:

```
using System;
using System.Collections.Generic;
using System.Globalization;
using System.IO;
using System.Linq;
using System.Web;

namespace Lab04.App_Code
{
    public static class InOutUtils
    {
        /// <summary>
        /// Reads Data from file directory
        /// </summary>
        /// <param name="fileDirectory"> file directory</param>
        /// <returns></returns>
        /// <exception cref="Exception"></exception>
        public static List<Library> ReadData(string fileDirectory)
        {
            List<Library> list = new List<Library>();
            foreach (string filePath in Directory.GetFiles(fileDirectory))
            {
                string[] lines = File.ReadAllLines(filePath);
                Library library = new Library(lines[0], lines[1], lines[2]);
                for (int i = 3; i < lines.Length; i++)
                {
                    string[] elements = lines[i].Split(';');
                    string name = elements[0];
                    string publisherType = elements[1];
                    string type = elements[2];
                    string publisher = elements[3];
                    DateTime releaseDate;
                    int pageCount;
                    int numberReleased;

                    try
                    {
                        releaseDate = DateTime.Parse(elements[4]);
                        pageCount = int.Parse(elements[5]);
                        numberReleased = int.Parse(elements[6]);
                    }
                    catch (Exception ex)
                    {
                        throw new Exception(string.Format(" Method {0}, Message {1}, 
Source {2}", ex.TargetSite, ex.Message, ex.Source));
                    }
                    try
                    {
                        switch (publisherType)
                        {
                            case "Book":
                                string isbnBook = elements[7];
                                string author = elements[8];
                                Book book = new Book(name, type, publisher, releaseDate, 
pageCount, numberReleased, isbnBook, author);
                                library.Add(book);
                                break;

                            case "Journal":
                                string isbnJournal = elements[7];
                                int number = int.Parse(elements[8]);
                                Journal journal = new Journal(name, type, publisher, 
releaseDate, pageCount, numberReleased, isbnJournal, number);
                                library.Add(journal);
                                break;

                            case "Newspaper":
                                int numberPaper = int.Parse(elements[7]);
                                Newspaper paper = new Newspaper(name, type, publisher, 
releaseDate, pageCount, numberReleased, numberPaper);
                                library.Add(paper);
                                break;
                        }
                    }
                    catch (Exception ex)
                    {
                        throw new Exception(string.Format(" Method {0}, Message {1}, 
Source {2}", ex.TargetSite, ex.Message, ex.Source));
                    }
                }
                list.Add(library);
            }
            return list;
        }

        public static void CreateFile(string fileName)
        {
            new StreamWriter(fileName).Close();
        }
        public static void WriteLibrary(List<Library> libraries, string fileName, string 
header)
        {
            try
            {
                using (StreamWriter sw = new StreamWriter(fileName, append: true))
                {
                    sw.WriteLine(header);
                    sw.WriteLine();
                    foreach (Library library in libraries)
                    {
                        sw.WriteLine(library.Name);
                        sw.WriteLine(library.Address);
                        sw.WriteLine(library.PhoneNumber);
                        sw.WriteLine(new String('-', 100));
                        sw.WriteLine($"{"Name",-25} |{"Type",-15} |{"Publisher",-25}
|{"ReleaseDate",-20} |{"PageCount",-10} |{"NumberReleased",-15} |{"ISBN/Number",-15}
|{"Author/Number",-20}");
                        for (int i = 0; i < library.Count; i++)
                        {
                            sw.WriteLine(library.Get(i));
                        }

                        sw.WriteLine();
                    }
                }
            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }
        }

        /// <summary>
        /// Writes all publications from List Publicatrion object
        /// </summary>
        /// <param name="publications"> List Publication object</param>
        /// <param name="fileName"> Output file</param>
        /// <param name="header"> Headerd</param>
        public static void WritePublication(List<Publication> publications, string
fileName, string header)
        {
            using (StreamWriter sw = new StreamWriter(fileName, append: true))
            {
                sw.WriteLine(header);
                sw.WriteLine();
                sw.WriteLine($"{"Name",-25} |{"Type",-15} |{"Publisher",-25}
|{"ReleaseDate",-20} |{"PageCount",-10} |{"NumberReleased",-15} |{"ISBN/Number",-15}|
{"Author/Number",-20}");
                foreach (Publication publication in publications)
                {
                    sw.WriteLine(publication);
                }
                sw.WriteLine();
            }
        }

        /// <summary>
        /// Writes Older than 2 years List to txt file
        /// </summary>
        /// <param name="libraries"> List Library file </param>
        /// <param name="fileName"> Filename to input file </param>
        /// <param name="header"> Header of the text</param>
        public static void WriteOlderThan(List<Library> libraries, string fileName,
string header)
        {
            using (StreamWriter sw = new StreamWriter(fileName, append: true))
            {
                sw.WriteLine(header);
                sw.WriteLine();
                foreach (Library library in libraries)
                {
                    sw.WriteLine($"{library.Name} has {library.OlderThanCount(2)}
publications older than 2 years");
                    sw.WriteLine();
                }
                sw.WriteLine();
            }
        }
        public static void OutputLargeReleases(List<Publication> publications, string
fileName)
        {
            using (StreamWriter sw = new StreamWriter(fileName))
            {
                sw.WriteLine("Name;Release Number");
                foreach (Publication publication in publications)
                {
                    sw.WriteLine($"{publication.Name};{publication.NumberReleased}");
                }
            }
        }
    }
}
```

Lab04Form.aspx:

```
<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="Lab04Form.aspx.cs"
Inherits="Lab04.Lab04Form" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <link rel="stylesheet" runat="server" media="screen" href="~/css/stylesheet.css" />
    <title></title>
</head>
<body>
    <form id="form1" runat="server">
        <div>
            Initial Data:<br />
            <asp:Table ID="Table0" runat="server">
            </asp:Table>
            <br />
            Older than 2 years:<br />
            <asp:Table ID="Table1" runat="server">
            </asp:Table>
            <br />
            &quot;Mokslinis&quot; type publication<br />
            <asp:Table ID="Table2" runat="server">
            </asp:Table>
            <br />
            Old releases<br />
            <asp:Table ID="Table3" runat="server">
            </asp:Table>
            <br />
            <br />
            Very large releases (10 000+)<br />
            <asp:Table ID="Table4" runat="server">
            </asp:Table>
        </div>
    </form>
</body>
</html>
```

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;
using Lab04.App_Code;
```

```
namespace Lab04
{
    public partial class Lab04Form : System.Web.UI.Page
    {
        private string inputDirectory = @"App_Data/Data1";
        private string outputFile = @"App_Data/Output.txt";
        protected void Page_Load(object sender, EventArgs e)
        {
            // Starting Data
            List<Library> libraries =
InOutUtils.ReadData(Server.MapPath(inputDirectory));
            InOutUtils.CreateFile(Server.MapPath(outputFile));
            InOutUtils.WriteLibrary(libraries, Server.MapPath(outputFile), "Initial
Data:");
            AddLibraries(libraries, Table0);

            // Task 1
            InOutUtils.WriteOlderThan(libraries, Server.MapPath(outputFile), "Older Than
2 Years Publications in specific libraries");
            GetOlder(Table1, libraries);

            // Task 2
            List<Publication> withSelectedType = TaskUtils.GetAllWithType(libraries,
"Mokslinis");
            InOutUtils.WritePublication(withSelectedType, Server.MapPath(outputFile),
"\"Mokslinis\" type publication:");
            FillTable(Table2, withSelectedType);

            // Task 3
            List<Publication> notNewPublications =
TaskUtils.GetNotNewPublications(libraries);
            notNewPublications.BubbleSort();
            InOutUtils.WritePublication(notNewPublications, Server.MapPath(outputFile),
"Old Publications");
            FillTable(Table3, notNewPublications);

            // Task 4
            List<Publication> largePublications = TaskUtils.GetLargeReleases(libraries);
            InOutUtils.OutputLargeReleases(largePublications,
Server.MapPath("App_Data/PopuliarusLeidiniai.csv"));
            FillTable(Table4, largePublications);

        }

        public void AddLibraries(List<Library> libraries, Table table)
        {
            try
            {
                foreach (Library library in libraries)
                {
                    TableRow row = new TableRow();
                    row.Cells.Add(CreateCell(library.Name));
                    row.Cells.Add(CreateCell(library.Address));
                    row.Cells.Add(CreateCell(library.PhoneNumber));
                    table.Rows.Add(row);
                    row = new TableRow();
                    row.Cells.Add(CreateCell("Name"));
                    row.Cells.Add(CreateCell("Type"));
                    row.Cells.Add(CreateCell("Publisher"));
                    row.Cells.Add(CreateCell("ReleaseDate"));
                    row.Cells.Add(CreateCell("PageCount"));
                    row.Cells.Add(CreateCell("NumberReleased"));
                    row.Cells.Add(CreateCell("ISBN/Number"));
                    row.Cells.Add(CreateCell("Author/Number"));
                    table.Rows.Add(row);
                    for (int i = 0; i < library.Count; i++)
                    {
                        Publication publication = library.Get(i);
                        table.Rows.Add(GetRow(publication));
                    }
                }

            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }
        }

        /// <summary>
        /// Gets Older than 2 years publications
        /// </summary>
        /// <param name="table"> Input Table</param>
        /// <param name="libraries">List<Library> libraries</Library></param>
        /// <exception cref="Exception"></exception>
        public void GetOlder(Table table, List<Library> libraries)
        {
            try
            {
                TableRow row = new TableRow();
                foreach (Library library in libraries)
                {
                    TableRow tempRow = new TableRow();
                    tempRow.Cells.Add(CreateCell($"{library.Name} has
{library.OlderThanCount(2)} publications older than 2 years"));
                    table.Rows.Add(tempRow);
                }
            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }
        }

        /// <summary>
        /// Fills Table
        /// </summary>
        /// <param name="table"></param>
        /// <param name="publications"></param>
        /// <exception cref="Exception"></exception>
        public void FillTable(Table table, List<Publication> publications)
        {
            try
            {
                TableRow row = new TableRow();
                row.Cells.Add(CreateCell("Name"));
                row.Cells.Add(CreateCell("Type"));
                row.Cells.Add(CreateCell("Publisher"));
                row.Cells.Add(CreateCell("ReleaseDate"));
                row.Cells.Add(CreateCell("PageCount"));
                row.Cells.Add(CreateCell("NumberReleased"));
                row.Cells.Add(CreateCell("ISBN/Number"));
                row.Cells.Add(CreateCell("Author/Number"));
                table.Rows.Add(row);

                foreach (Publication publication in publications)
                {
                    table.Rows.Add(GetRow(publication));
                }
            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }
        }

        /// <summary>
        /// Creates TableRow from Book object
        /// </summary>
        /// <param name="data">Book object</param>
        /// <returns>TableRow object</returns>
        public TableRow GetRow(Publication data)
        {
            TableRow row = new TableRow();
            string[] elements = data.ToString().Split('|');
            foreach (string element in elements)
                row.Cells.Add(CreateCell(element.Trim()));

            return row;
        }

        /// <summary>
        /// Creates TableCell from text to speed up TableCell creation
        /// </summary>
        /// <param name="text">string text to add to the table cell</param>
        /// <returns>TableCell class object</returns>
        protected static TableCell CreateCell(string text)
        {
            TableCell cell = new TableCell();
            cell.Text = text;
            return cell;
        }


    }
}
```

## 4.7. Pradiniai duomenys ir rezultatai

```
Pradiniai Duomenys 1:


Tikslas - maištyti duomenys su skirtingais tipais
KTU.txt:

Kauno Biblioteka
Kauno adresato g. 1
8675946855
Knyga 1;Book;Mokslinis;Kauno knygos;5/3/2020;125;1000;123546;Visų Rašytojas;
Laikraštis 1918;Newspaper;Istorinis;Istoriniai laikraščiai;5/3/2022;25;200;124
Knyga 3;Book;Pramoginis;Stumbro Lapai;5/5/2022;253;250;111111;Rašytojas 1
Žurnalas Pasaulis;Journal;Geografinis;Pasaulio
žemėlapiai;1/1/2000;64;15000;555555;1
Žurnalas Mokslas;Journal;Mokslinis;Mokslu susidomėja;5/3/2022;32;3000;444444;45

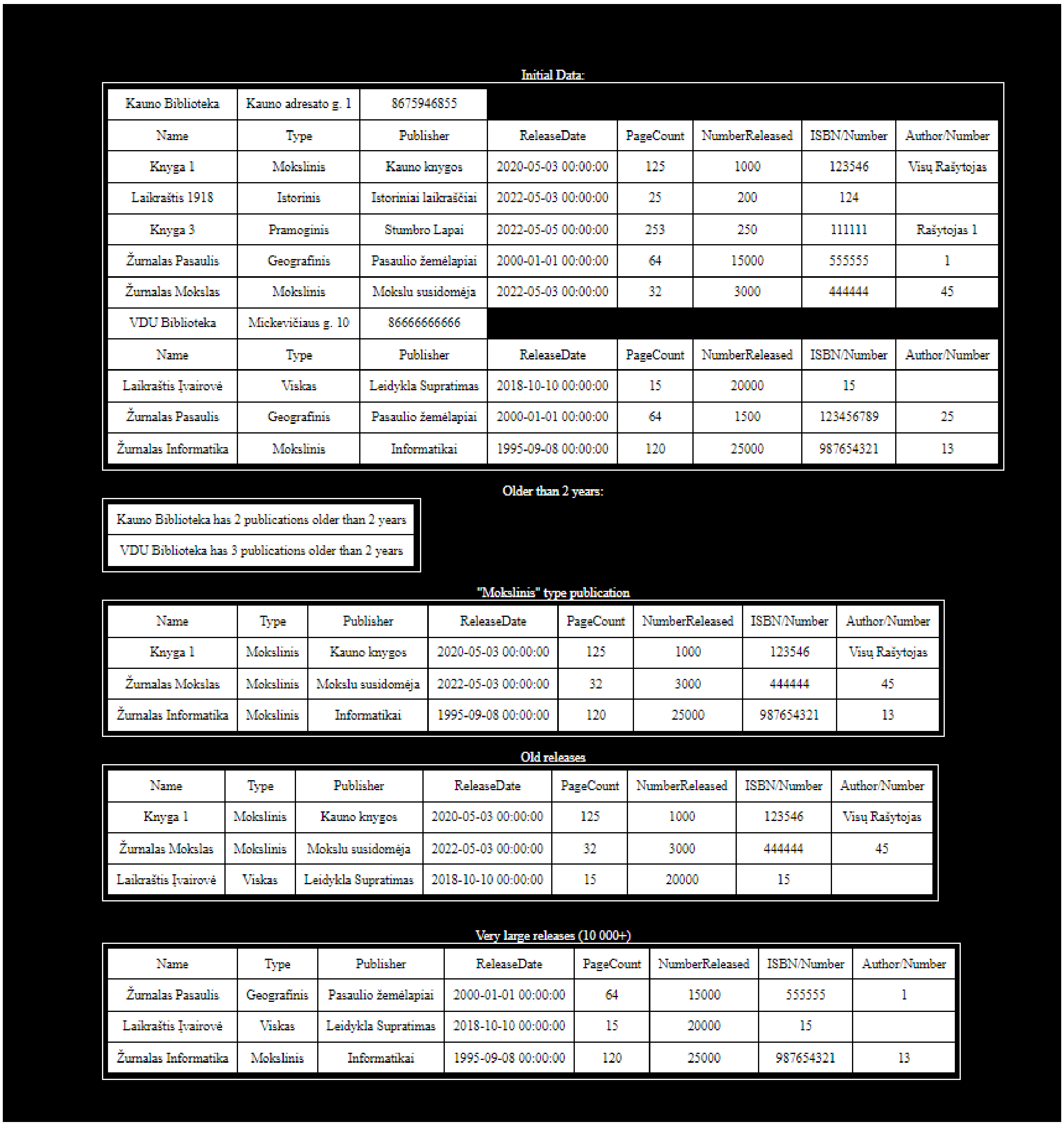

Tikslas – maištyti skirtingi duomenys su skirtingais tipais

VDU.txt:
```

```
VDU Biblioteka
Mickevičiaus g. 10
86666666666
Laikraštis Įvairovė;Newspaper;Viskas;Leidykla Supratimas;10/10/2018;15;20000;15
Žurnalas Pasaulis;Journal;Geografinis;Pasaulio
žemėlapiai;1/1/2000;64;1500;123456789;25
Žurnalas
Informatika;Journal;Mokslinis;Informatikai;9/8/1995;120;25000;987654321;13
```

Rezultatai 1:

Vartotojo sąsaja:



Initial Data:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Kauno Biblioteka | Kauno adresato g. 1 | 8675946855 | | | | | |
| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
| Knyga 1 | Mokslinis | Kauno knygos | 2020-05-03 00:00:00 | 125 | 1000 | 123546 | Visų Rašytojas |
| Laikraštis 1918 | Istorinis | Istoriniai laikraščiai | 2022-05-03 00:00:00 | 25 | 200 | 124 | |
| Knyga 3 | Pramoginis | Stumbro Lapai | 2022-05-05 00:00:00 | 253 | 250 | 111111 | Rašytojas 1 |
| Žurnalas Pasaulis | Geografinis | Pasaulio žemėlapiai | 2000-01-01 00:00:00 | 64 | 15000 | 555555 | 1 |
| Žurnalas Mokslas | Mokslinis | Mokslu susidomėja | 2022-05-03 00:00:00 | 32 | 3000 | 444444 | 45 |
| VDU Biblioteka | Mickevičiaus g. 10 | 86666666666 | | | | | |
| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
| Laikraštis Įvairovė | Viskas | Leidykla Supratimas | 2018-10-10 00:00:00 | 15 | 20000 | 15 | |
| Žurnalas Pasaulis | Geografinis | Pasaulio žemėlapiai | 2000-01-01 00:00:00 | 64 | 1500 | 123456789 | 25 |
| Žurnalas Informatika | Mokslinis | Informatikai | 1995-09-08 00:00:00 | 120 | 25000 | 987654321 | 13 |

Older than 2 years:

| |
|---|
| Kauno Biblioteka has 2 publications older than 2 years |
| VDU Biblioteka has 3 publications older than 2 years |

"Mokslinis" type publication

| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
|---|---|---|---|---|---|---|---|
| Knyga 1 | Mokslinis | Kauno knygos | 2020-05-03 00:00:00 | 125 | 1000 | 123546 | Visų Rašytojas |
| Žurnalas Mokslas | Mokslinis | Mokslu susidomėja | 2022-05-03 00:00:00 | 32 | 3000 | 444444 | 45 |
| Žurnalas Informatika | Mokslinis | Informatikai | 1995-09-08 00:00:00 | 120 | 25000 | 987654321 | 13 |

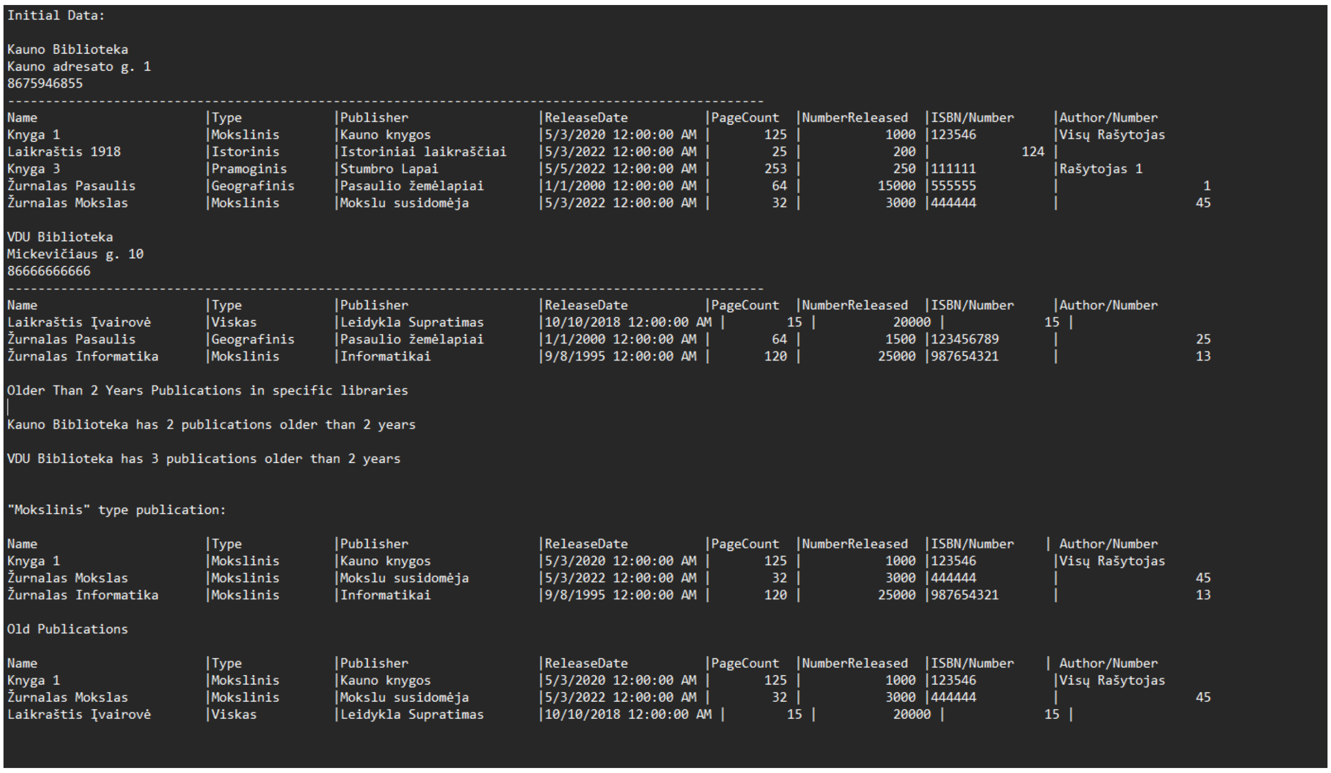
Old releases

| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
|---|---|---|---|---|---|---|---|
| Knyga 1 | Mokslinis | Kauno knygos | 2020-05-03 00:00:00 | 125 | 1000 | 123546 | Visų Rašytojas |
| Žurnalas Mokslas | Mokslinis | Mokslu susidomėja | 2022-05-03 00:00:00 | 32 | 3000 | 444444 | 45 |
| Laikraštis Įvairovė | Viskas | Leidykla Supratimas | 2018-10-10 00:00:00 | 15 | 20000 | 15 | |

Very large releases (10 000+)

| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
|---|---|---|---|---|---|---|---|
| Žurnalas Pasaulis | Geografinis | Pasaulio žemėlapiai | 2000-01-01 00:00:00 | 64 | 15000 | 555555 | 1 |
| Laikraštis Įvairovė | Viskas | Leidykla Supratimas | 2018-10-10 00:00:00 | 15 | 20000 | 15 | |
| Žurnalas Informatika | Mokslinis | Informatikai | 1995-09-08 00:00:00 | 120 | 25000 | 987654321 | 13 |

Output.txt:



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Initial Data:

Kauno Biblioteka
Kauno adresato g. 1
8675946855
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Name                      |Type             |Publisher                  |ReleaseDate           |PageCount  |NumberReleased  |ISBN/Number     |Author/Number
Knyga 1                   |Mokslinis        |Kauno knygos               |5/3/2020 12:00:00 AM |       125 |           1000 |123546          |Visų Rašytojas
Laikraštis 1918           |Istorinis        |Istoriniai laikraščiai     |5/3/2022 12:00:00 AM |        25 |            200 |             124 |
Knyga 3                   |Pramoginis       |Stumbro Lapai              |5/5/2022 12:00:00 AM |       253 |            250 |111111          |Rašytojas 1
Žurnalas Pasaulis         |Geografinis      |Pasaulio žemėlapiai        |1/1/2000 12:00:00 AM |        64 |          15000 |555555          |                    1
Žurnalas Mokslas          |Mokslinis        |Mokslu susidomėja          |5/3/2022 12:00:00 AM |        32 |           3000 |444444          |                   45

VDU Biblioteka
Mickevičiaus g. 10
86666666666
----------------------------------------------------------------------------------------------------
Name                      |Type             |Publisher                  |ReleaseDate           |PageCount  |NumberReleased  |ISBN/Number     |Author/Number
Laikraštis Įvairovė       |Viskas           |Leidykla Supratimas        |10/10/2018 12:00:00 AM |        15 |          20000 |              15 |
Žurnalas Pasaulis         |Geografinis      |Pasaulio žemėlapiai        |1/1/2000 12:00:00 AM |        64 |           1500 |123456789       |                   25
Žurnalas Informatika      |Mokslinis        |Informatikai               |9/8/1995 12:00:00 AM |       120 |          25000 |987654321       |                   13

Older Than 2 Years Publications in specific libraries
|
Kauno Biblioteka has 2 publications older than 2 years

VDU Biblioteka has 3 publications older than 2 years

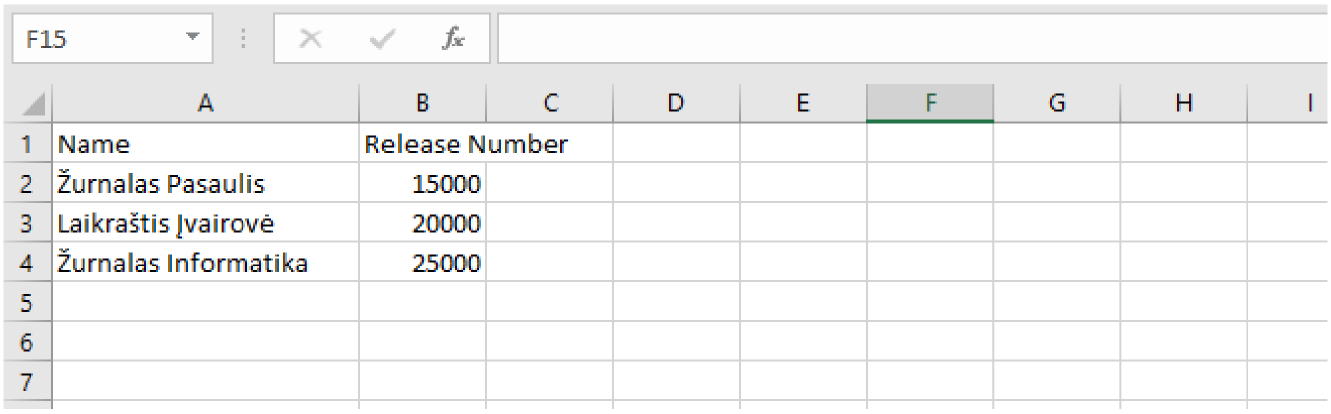

"Mokslinis" type publication:

Name                      |Type             |Publisher                  |ReleaseDate           |PageCount  |NumberReleased  |ISBN/Number     | Author/Number
Knyga 1                   |Mokslinis        |Kauno knygos               |5/3/2020 12:00:00 AM |       125 |           1000 |123546          |Visų Rašytojas
Žurnalas Mokslas          |Mokslinis        |Mokslu susidomėja          |5/3/2022 12:00:00 AM |        32 |           3000 |444444          |                   45
Žurnalas Informatika      |Mokslinis        |Informatikai               |9/8/1995 12:00:00 AM |       120 |          25000 |987654321       |                   13

Old Publications

Name                      |Type             |Publisher                  |ReleaseDate           |PageCount  |NumberReleased  |ISBN/Number     | Author/Number
Knyga 1                   |Mokslinis        |Kauno knygos               |5/3/2020 12:00:00 AM |       125 |           1000 |123546          |Visų Rašytojas
Žurnalas Mokslas          |Mokslinis        |Mokslu susidomėja          |5/3/2022 12:00:00 AM |        32 |           3000 |444444          |                   45
Laikraštis Įvairovė       |Viskas           |Leidykla Supratimas        |10/10/2018 12:00:00 AM |        15 |          20000 |              15 |
```

PopuliarusLeidiniai.csv:



F15

|   | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Name | Release Number | | | | | | | |
| 2 | Žurnalas Pasaulis | 15000 | | | | | | | |
| 3 | Laikraštis Įvairovė | 20000 | | | | | | | |
| 4 | Žurnalas Informatika | 25000 | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |

Duomenys 2:

Tikslas – duomenys yra tik žurnalai.

SMK.txt:

```
SMK Biblioteka
Aleksoto g. 26
8656546984896
Žurnalas Draugas;Journal;Psichologija;Psichologijos
darbai;1/1/2025;25;100;123456789;25
Žurnalas
Mokslinčius;Journal;Mokslinis;Mokslininkai;6/7/2021;120;25000;987654321;13
```

Tikslas – duomenys yra tik laikraščiai.

VGTU.txt:

```
VGTU Biblioteka
Mickevičiaus g. 356
86666111111
Laikraštis Tikslas;Newspaper;Mokslinis;Leidykla Tiksliukai;5/10/2021;25;200;30
Laikraštis Abstraktas;Newspaper;Filosofija;Leidykla
Filosofantas;1/1/2022;15;10000;15
```

Tikslas – duomenys yra tik knygos

VU.txt:

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VU Mažoji Biblioteka
Vilniaus g. 20
8764564694
Katekizmas;Book;Mokslinis;Kauno knygos;5/3/1547;79;27;123546;Mažvydas;
Raganius;Book;Pramoginis;Andrejus Sapovskis;5/5/1991;423;250000;111111;Fantastikos
Rašytojas
```

```
Rezultatai 2:

Vartotojo sąsaja:
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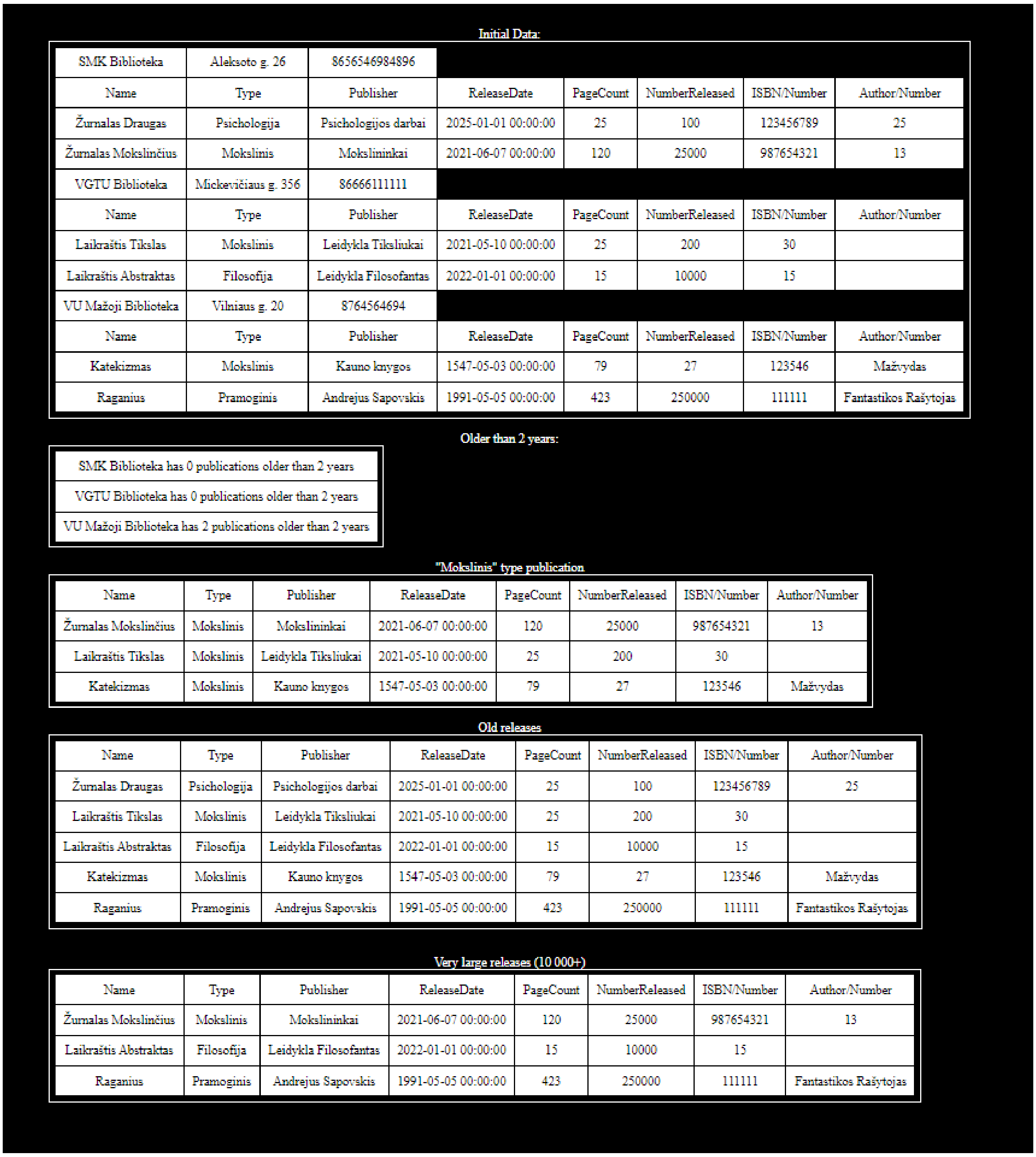

**Initial Data:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SMK Biblioteka | Aleksoto g. 26 | 8656546984896 | | | | | |
| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
| Žurnalas Draugas | Psichologija | Psichologijos darbai | 2025-01-01 00:00:00 | 25 | 100 | 123456789 | 25 |
| Žurnalas Mokslinčius | Mokslinis | Mokslininkai | 2021-06-07 00:00:00 | 120 | 25000 | 987654321 | 13 |
| VGTU Biblioteka | Mickevičiaus g. 356 | 86666111111 | | | | | |
| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
| Laikraštis Tikslas | Mokslinis | Leidykla Tiksliukai | 2021-05-10 00:00:00 | 25 | 200 | 30 | |
| Laikraštis Abstraktas | Filosofija | Leidykla Filosofantas | 2022-01-01 00:00:00 | 15 | 10000 | 15 | |
| VU Mažoji Biblioteka | Vilniaus g. 20 | 8764564694 | | | | | |
| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
| Katekizmas | Mokslinis | Kauno knygos | 1547-05-03 00:00:00 | 79 | 27 | 123546 | Mažvydas |
| Raganius | Pramoginis | Andrejus Sapovskis | 1991-05-05 00:00:00 | 423 | 250000 | 111111 | Fantastikos Rašytojas |

**Older than 2 years:**

| |
|---|
| SMK Biblioteka has 0 publications older than 2 years |
| VGTU Biblioteka has 0 publications older than 2 years |
| VU Mažoji Biblioteka has 2 publications older than 2 years |

**"Mokslinis" type publication**

| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
|---|---|---|---|---|---|---|---|
| Žurnalas Mokslinčius | Mokslinis | Mokslininkai | 2021-06-07 00:00:00 | 120 | 25000 | 987654321 | 13 |
| Laikraštis Tikslas | Mokslinis | Leidykla Tiksliukai | 2021-05-10 00:00:00 | 25 | 200 | 30 | |
| Katekizmas | Mokslinis | Kauno knygos | 1547-05-03 00:00:00 | 79 | 27 | 123546 | Mažvydas |

**Old releases**

| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
|---|---|---|---|---|---|---|---|
| Žurnalas Draugas | Psichologija | Psichologijos darbai | 2025-01-01 00:00:00 | 25 | 100 | 123456789 | 25 |
| Laikraštis Tikslas | Mokslinis | Leidykla Tiksliukai | 2021-05-10 00:00:00 | 25 | 200 | 30 | |
| Laikraštis Abstraktas | Filosofija | Leidykla Filosofantas | 2022-01-01 00:00:00 | 15 | 10000 | 15 | |
| Katekizmas | Mokslinis | Kauno knygos | 1547-05-03 00:00:00 | 79 | 27 | 123546 | Mažvydas |
| Raganius | Pramoginis | Andrejus Sapovskis | 1991-05-05 00:00:00 | 423 | 250000 | 111111 | Fantastikos Rašytojas |

**Very large releases (10 000+)**

| Name | Type | Publisher | ReleaseDate | PageCount | NumberReleased | ISBN/Number | Author/Number |
|---|---|---|---|---|---|---|---|
| Žurnalas Mokslinčius | Mokslinis | Mokslininkai | 2021-06-07 00:00:00 | 120 | 25000 | 987654321 | 13 |
| Laikraštis Abstraktas | Filosofija | Leidykla Filosofantas | 2022-01-01 00:00:00 | 15 | 10000 | 15 | |
| Raganius | Pramoginis | Andrejus Sapovskis | 1991-05-05 00:00:00 | 423 | 250000 | 111111 | Fantastikos Rašytojas |

```
Output.txt:
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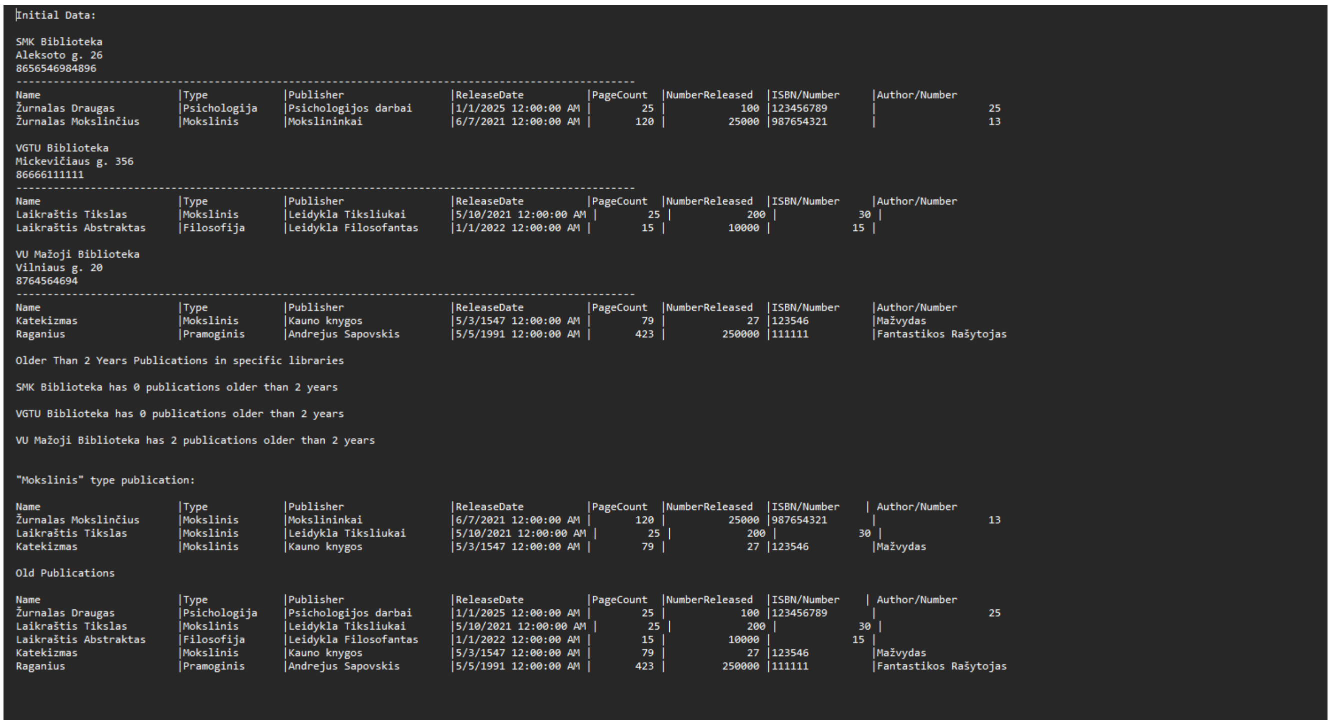

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Initial Data:

SMK Biblioteka
Aleksoto g. 26
8656546984896
----------------------------------------------------------------------------------------------------
Name                      |Type            |Publisher                 |ReleaseDate          |PageCount  |NumberReleased  |ISBN/Number     |Author/Number
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Žurnalas Mokslinčius      |Mokslinis       |Mokslininkai              |6/7/2021 12:00:00 AM |       120 |          25000 |987654321       |                  13

VGTU Biblioteka
Mickevičiaus g. 356
86666111111
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Name                      |Type            |Publisher                 |ReleaseDate          |PageCount  |NumberReleased  |ISBN/Number     |Author/Number
Laikraštis Tikslas        |Mokslinis       |Leidykla Tiksliukai       |5/10/2021 12:00:00 AM |        25 |            200 |             30 |
Laikraštis Abstraktas     |Filosofija      |Leidykla Filosofantas     |1/1/2022 12:00:00 AM |        15 |          10000 |             15 |

VU Mažoji Biblioteka
Vilniaus g. 20
8764564694
----------------------------------------------------------------------------------------------------
Name                      |Type            |Publisher                 |ReleaseDate          |PageCount  |NumberReleased  |ISBN/Number     |Author/Number
Katekizmas                |Mokslinis       |Kauno knygos              |5/3/1547 12:00:00 AM |        79 |             27 |123546          |Mažvydas
Raganius                  |Pramoginis      |Andrejus Sapovskis        |5/5/1991 12:00:00 AM |       423 |         250000 |111111          |Fantastikos Rašytojas

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SMK Biblioteka has 0 publications older than 2 years

VGTU Biblioteka has 0 publications older than 2 years

VU Mažoji Biblioteka has 2 publications older than 2 years

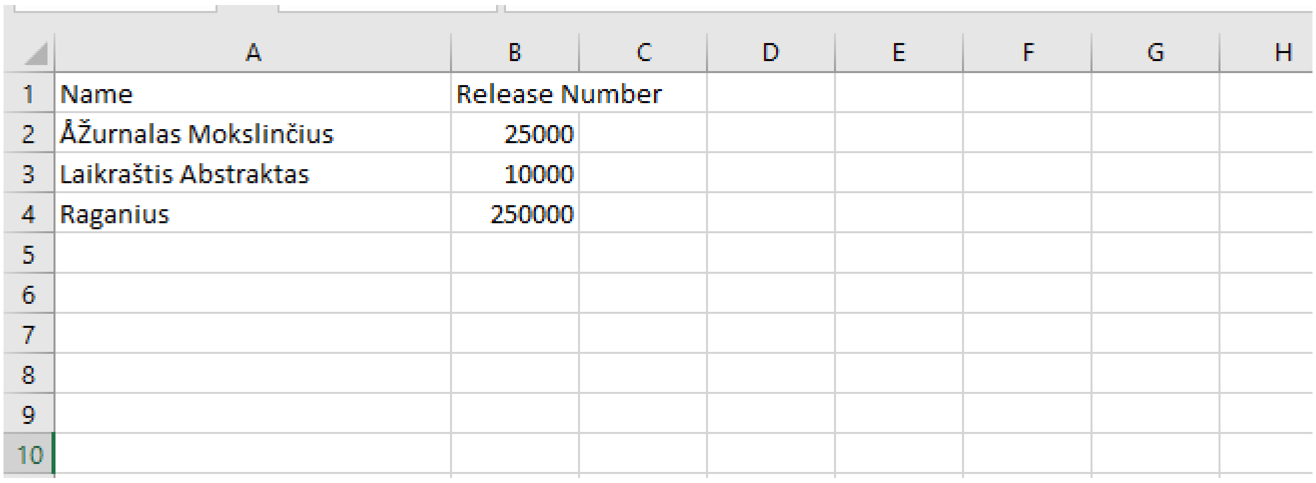

"Mokslinis" type publication:

Name                      |Type            |Publisher                 |ReleaseDate          |PageCount  |NumberReleased  |ISBN/Number    | Author/Number
Žurnalas Mokslinčius      |Mokslinis       |Mokslininkai              |6/7/2021 12:00:00 AM |       120 |          25000 |987654321       |                  13
Laikraštis Tikslas        |Mokslinis       |Leidykla Tiksliukai       |5/10/2021 12:00:00 AM |        25 |            200 |             30 |
Katekizmas                |Mokslinis       |Kauno knygos              |5/3/1547 12:00:00 AM |        79 |             27 |123546          |Mažvydas

Old Publications

Name                      |Type            |Publisher                 |ReleaseDate          |PageCount  |NumberReleased  |ISBN/Number    | Author/Number
Žurnalas Draugas          |Psichologija    |Psichologijos darbai      |1/1/2025 12:00:00 AM |        25 |            100 |123456789       |                  25
Laikraštis Tikslas        |Mokslinis       |Leidykla Tiksliukai       |5/10/2021 12:00:00 AM |        25 |            200 |             30 |
Laikraštis Abstraktas     |Filosofija      |Leidykla Filosofantas     |1/1/2022 12:00:00 AM |        15 |          10000 |             15 |
Katekizmas                |Mokslinis       |Kauno knygos              |5/3/1547 12:00:00 AM |        79 |             27 |123546          |Mažvydas
Raganius                  |Pramoginis      |Andrejus Sapovskis        |5/5/1991 12:00:00 AM |       423 |         250000 |111111          |Fantastikos Rašytojas
```

PopuliarusLeidiniai.csv:



|  | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Name | Release Number |  |  |  |  |  |  |
| 2 | ÅŽurnalas Mokslinčius | 25000 |  |  |  |  |  |  |
| 3 | Laikraštis Abstraktas | 10000 |  |  |  |  |  |  |
| 4 | Raganius | 250000 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |
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| 7 |  |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |  |  |

## 4.8. Dėstytojo pastabos

1. Nėra testų tikslų.
2. Komponentų sąsajoje keičiamos savybės?
3. O kur pažymiai LD3 pastabose?

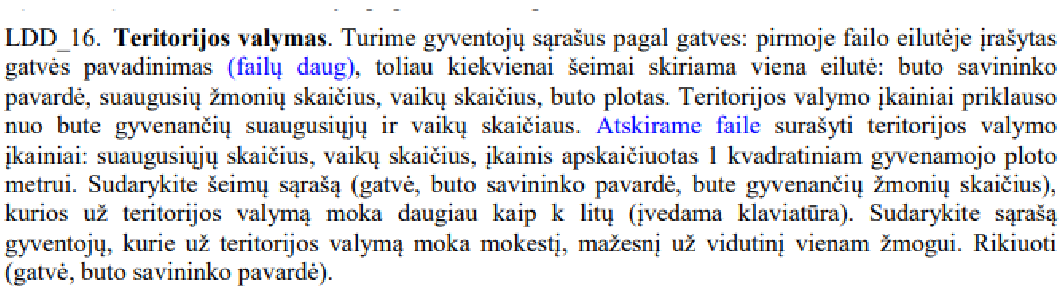
Papildomi taškai: 2

Laboratorinio įvertinimas: 6

Bendras: 8

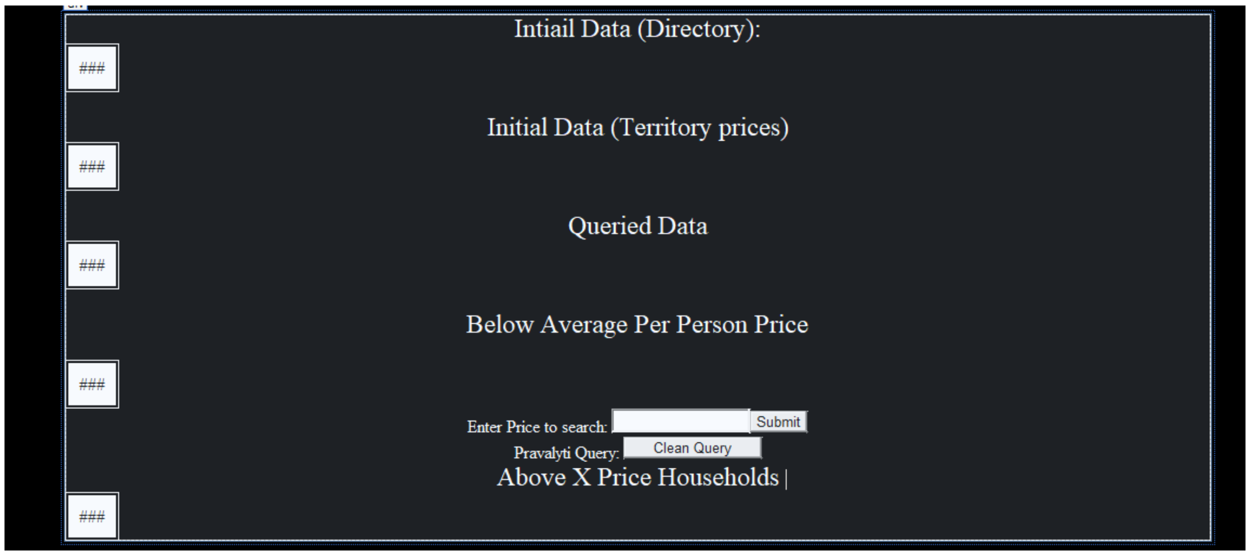
## 5. Deklaratyvusis programavimas (L5)

### 5.1. Darbo užduotis



LDD_16. **Teritorijos valymas**. Turime gyventojų sąrašus pagal gatves: pirmoje failo eilutėje įrašytas gatvės pavadinimas (failų daug), toliau kiekvienai šeimai skiriama viena eilutė: buto savininko pavardė, suaugusių žmonių skaičius, vaikų skaičius, buto plotas. Teritorijos valymo įkainiai priklauso nuo bute gyvenančių suaugusiųjų ir vaikų skaičiaus. Atskirame faile surašyti teritorijos valymo įkainiai: suaugusiųjų skaičius, vaikų skaičius, įkainis apskaičiuotas 1 kvadratiniam gyvenamojo ploto metrui. Sudarykite šeimų sąrašą (gatvė, buto savininko pavardė, bute gyvenančių žmonių skaičius), kurios už teritorijos valymą moka daugiau kaip k litų (įvedama klaviatūra). Sudarykite sąrašą gyventojų, kurie už teritorijos valymą moka mokestį, mažesnį už vidutinį vienam žmogui. Rikiuoti (gatvė, buto savininko pavardė).

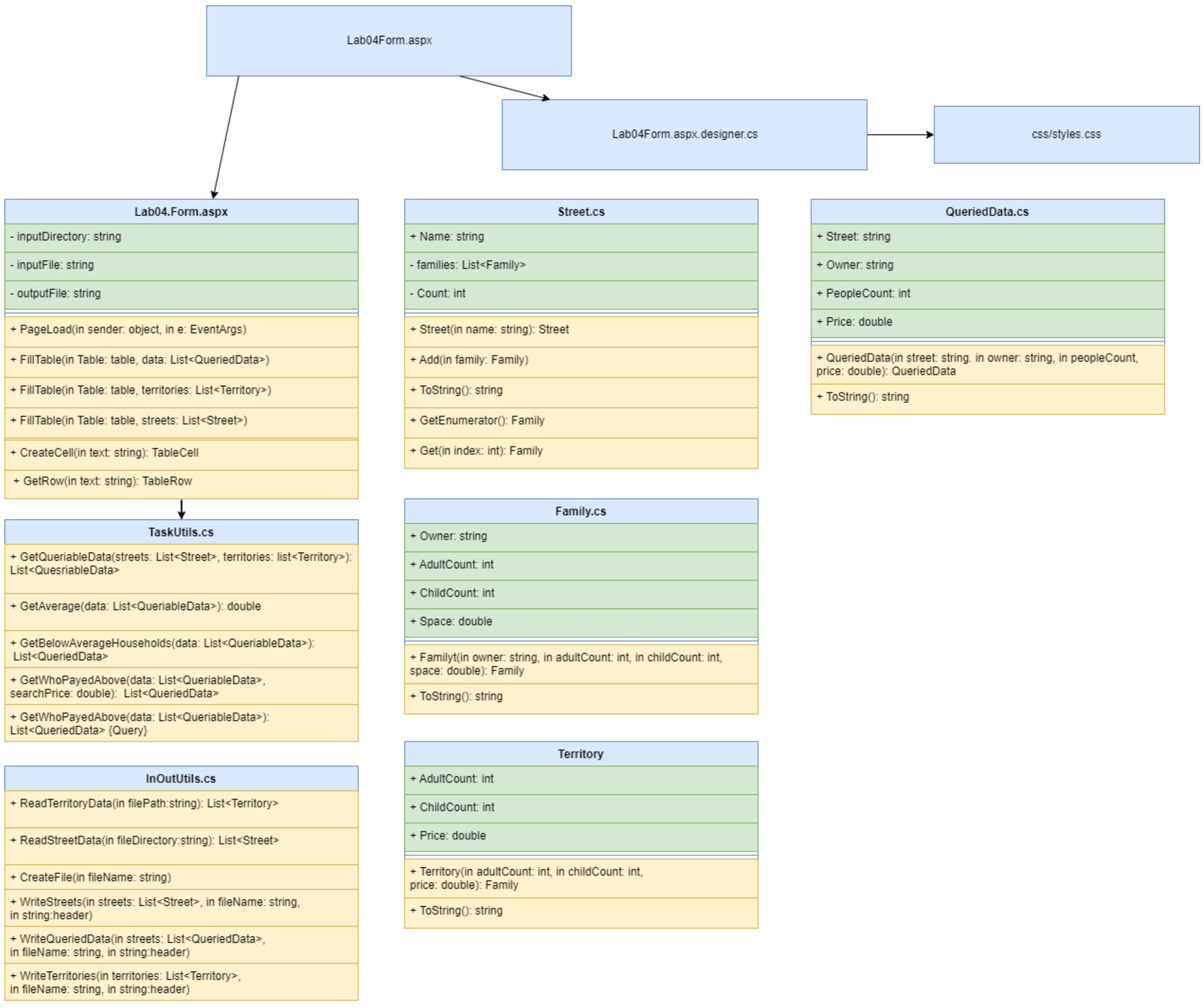
### 5.2. Grafinės vartotojo sąsajos schema



### 5.3. Sąsajoje panaudotų komponentų keičiamos savybės

| Komponentas | Savybė | Reikšmė |
|---|---|---|
| Label0 | Text | Initial Data (Directory) |
| Label2 | Text | Initial Data (Territory prices) |
| Label4 | Text | Queried Data |
| Label1 | Text | Below Average Per Person Price |
| Button1 | Text | Submit |
| Label3 | Text | Above X Price Households |
| Button2 | Text | Clean Query |

## 5.4. Klasių diagrama



Lab04Form.aspx
Lab04Form.aspx.designer.cs
css/styles.css
Lab04.Form.aspx
- inputDirectory: string
- inputFile: string
- outputFile: string
+ PageLoad(in sender: object, in e: EventArgs)
+ FillTable(in Table: table, data: List<QueriedData>)
+ FillTable(in Table: table, territories: List<Territory>)
+ FillTable(in Table: table, streets: List<Street>)
+ CreateCell(in text: string): TableCell
+ GetRow(in text: string): TableRow
TaskUtils.cs
+ GetQueriableData(streets: List<Street>, territories: list<Territory>): List<QuesriableData>
+ GetAverage(data: List<QueriableData>): double
+ GetBelowAverageHouseholds(data: List<QueriableData>): List<QueriedData>
+ GetWhoPayedAbove(data: List<QueriableData>, searchPrice: double): List<QueriedData>
+ GetWhoPayedAbove(data: List<QueriableData>): List<QueriedData> {Query}
InOutUtils.cs
+ ReadTerritoryData(in filePath:string): List<Territory>
+ ReadStreetData(in fileDirectory:string): List<Street>
+ CreateFile(in fileName: string)
+ WriteStreets(in streets: List<Street>, in fileName: string, in string:header)
+ WriteQueriedData(in streets: List<QueriedData>, in fileName: string, in string:header)
+ WriteTerritories(in territories: List<Territory>, in fileName: string, in string:header)
Street.cs
+ Name: string
- families: List<Family>
- Count: int
+ Street(in name: string): Street
+ Add(in family: Family)
+ ToString(): string
+ GetEnumerator(): Family
+ Get(in index: int): Family
Family.cs
+ Owner: string
+ AdultCount: int
+ ChildCount: int
+ Space: double
+ Familyt(in owner: string, in adultCount: int, in childCount: int, space: double): Family
+ ToString(): string
Territory
+ AdultCount: int
+ ChildCount: int
+ Price: double
+ Territory(in adultCount: int, in childCount: int, price: double): Family
+ ToString(): string
QueriedData.cs
+ Street: string
+ Owner: string
+ PeopleCount: int
+ Price: double
+ QueriedData(in street: string. in owner: string, in peopleCount, price: double): QueriedData
+ ToString(): string

## 5.5. Programos vartotojo vadovas

Programa automatiškai užkrauną duomenų failus (Initial Data). Padaro visus skaičiavimus naudojant LINQ. Pirmas mygtukas leidžia daryti filtravimą pagal skaičių, kur ieškome šeimas, kurios išleidžia valymui daugiau negu įvesta suma. „Clean Query“ mygtukas panaikiną įvestą informaciją.

## 5.6. Programos tekstas

QueriedData.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
```

```
namespace Lab04.App_Code
{
    public class QueriedData
    {
        public string Street { get; set; }
        public string Owner { get; set; }
        public int PeopleCount { get; set; }

        public double Price { get; set; }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="street"> Street where the person lives</param>
        /// <param name="owner"> Lastname of the owner </param>
        /// <param name="peopleCount"> How many people live in the household</param>
        /// <param name="price"> Price per cleaning for the household </param>
        public QueriedData(string street, string owner, int peopleCount, double price)
        {
            Street = street;
            Owner = owner;
            PeopleCount = peopleCount;
            Price = price;
        }

        /// <summary>
        /// ToString override
        /// </summary>
        /// <returns> string </returns>
        public override string ToString()
        {
            return $"{Street, -20}|{Owner, -20}|{PeopleCount,15}|{Price,10:f}";
        }
    }
}
```

Territory.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab04.App_Code
{
    public class Territory
    {
        public int AdultCount { get; set; }
        public int ChildCount { get; set; }
        public double Price { get; set; }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="adultCount"> Adult Count in the household </param>
        /// <param name="childCount"> Children Counnt in the household </param>
        /// <param name="price"> Price per square meter </param>
        public Territory(int adultCount, int childCount, double price)
        {
            AdultCount = adultCount;
            ChildCount = childCount;
            Price = price;
        }


        /// <summary>
        /// String override
        /// </summary>
        /// <returns> object in string form</returns>
        public override string ToString()
        {
            return $"{AdultCount,10}|{ChildCount,10}|{Price,6}|";
        }
    }
}
```

Family.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab04.App_Code
{
    public class Family
    {
        public string Owner { get; set; }
        public int AdultCount { get; set; }
        public int ChildCount { get; set; }

        public double Space { get; set; }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="owner">Last name of the owner</param>
        /// <param name="adultCount"> Adults in the household</param>
        /// <param name="childCount"> Children in the household</param>
        /// <param name="space"> space in square meters in the household house</param>
        public Family(string owner, int adultCount, int childCount, double space)
        {
            Owner = owner;
            AdultCount = adultCount;
            ChildCount = childCount;
            Space = space;
        }


        /// <summary>
        /// String override
        /// </summary>
        /// <returns> object in string form</returns>
        public override string ToString()
        {
            return $"{Owner,-20}|{AdultCount,10}|{ChildCount, 10}|{Space, 6}|";
        }
    }
}
```

Street.cs:

```
using System;
using System.Collections;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab04.App_Code
{
    public class Street : IEnumerable<Family>
    {
        public string Name { get; set; }
        private List<Family> families;
        public int Count { get; set; }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="name"> Name of the street</param>
        public Street(string name)
        {
            Name = name;
            families = new List<Family>();
            Count = 0;
        }

        /// <summary>
        /// Adds an element to List
        /// </summary>
        /// <param name="family"> A family object </param>
        public void Add(Family family)
        {
            families.Add(family);
            Count++;
        }

        /// <summary>
        /// Gets element by Index
        /// </summary>
        /// <param name="index"> int index</param>
        /// <returns> returns Family Object</returns>
        /// <exception cref="Exception"></exception>
        public Family Get(int index)
        {
            try
            {
                return families[index];
            }
            // Index out of bonds
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }
        }

        /// <summary>
        /// String override
        /// </summary>
        /// <returns> object in string form</returns>
        public override string ToString()
        {
            return $"{Name}";
        }

        /// <summary>
        /// IEnumerator implementation
        /// </summary>
        /// <returns> iEnumerator</returns>
        public IEnumerator<Family> GetEnumerator()
        {
            foreach (Family family in families)
                yield return family;


        }
        /// <summary>
        /// Depricated
        /// </summary>
        /// <returns>IEnumerator</returns>
        IEnumerator IEnumerable.GetEnumerator()
        {
            return GetEnumerator();
        }
    }
}
```

InOutUtils.cs:

```
using System;
using System.Collections.Generic;
using System.Globalization;
using System.IO;
using System.Linq;
using System.Web;

namespace Lab04.App_Code
{
    public static class InOutUtils
    {
        /// <summary>
        /// Reads Data from file directory
        /// </summary>
        /// <param name="fileDirectory"> file directory</param>
        /// <returns> List of street</returns>
        /// <exception cref="Exception"></exception>
        public static List<Territory> ReadTerritoryData(string filePath)
        {
            List<Territory> list = new List<Territory>();
            string[] lines = File.ReadAllLines(filePath);
            for (int i = 0; i < lines.Length; i++)
            {
                string[] elements = lines[i].Split(';');
                int adultCount;
                int childCoubt;
                double price;
                try
                {
                    adultCount = int.Parse(elements[0]);
                    childCoubt = int.Parse(elements[1]);
                    price = Double.Parse(elements[2]);
                }
                catch (Exception ex)
                {
                    throw new Exception(string.Format(" Method {0}, Message {1}, Source
{2}", ex.TargetSite, ex.Message, ex.Source));
                }

                list.Add(new Territory(adultCount, childCoubt, price));
            }

            return list;
        }

        /// <summary>
        /// Reads Data from file directory
        /// </summary>
        /// <param name="fileDirectory"> file directory</param>
        /// <returns> List of street</returns>
        /// <exception cref="Exception"></exception>
        public static List<Street> ReadStreetData(string fileDirectory)
        {
            List<Street> list = new List<Street>();
            foreach (string filePath in Directory.GetFiles(fileDirectory))
            {
                string[] lines = File.ReadAllLines(filePath);
                Street street = new Street(lines[0]);
                for (int i = 1; i < lines.Length; i++)
                {
                    string[] elements = lines[i].Split(';');
                    string owner = elements[0];
                    int adultCount;
                    int childCoubt;
                    double space;
                    try
                    {
                        adultCount = int.Parse(elements[1]);
                        childCoubt = int.Parse(elements[2]);
                        space = Double.Parse(elements[3]);
                    }
                    catch (Exception ex)
                    {
                        throw new Exception(string.Format(" Method {0}, Message {1},
Source {2}", ex.TargetSite, ex.Message, ex.Source));
                    }

                    street.Add(new Family(owner, adultCount, childCoubt, space));
                }
                list.Add(street);
            }
            return list;
        }

        public static void CreateFile(string fileName)
        {
            new StreamWriter(fileName).Close();
        }

        /// <summary>
        /// Adds street object
        /// </summary>
        /// <param name="streets"> street objects that store the street name and
families</param>
        /// <param name="fileName"> file to append the data</param>
        /// <param name="header"> header to add a data</param>
        public static void WriteStreets(List<Street> streets, string fileName, string
header)
        {
            using (StreamWriter sw = new StreamWriter(fileName, append: true))
            {
                sw.WriteLine(header);
                sw.WriteLine();
                foreach (Street street in streets)
                {
                    sw.WriteLine(street.Name);
                    sw.WriteLine(new String('-', 100));
                    sw.WriteLine($"{"Owner",-20}|{"Adults",-
10}|{"Children",10}|{"Space",6}|");
                    for (int i = 0; i < street.Count; i++)
                    {
                        sw.WriteLine(street.Get(i));
                    }

                    sw.WriteLine();
                }
            }
        }
        /// <summary>
        /// Adds street object
        /// </summary>
        /// <param name="data"> queried data objects to write</param>
        /// <param name="fileName"> file to append the data</param>
        /// <param name="header"> header to add a data</param>
        public static void WriteQueriedData(List<QueriedData> data, string fileName,
string header)
        {
            using (StreamWriter sw = new StreamWriter(fileName, append: true))
            {
                sw.WriteLine(header);
                sw.WriteLine();
                sw.WriteLine(new String('-', 100));
                sw.WriteLine($"{"Street",-20}|{"Owner",-20}|{"Children",-15}|{"Space",-
10}|");
                foreach (QueriedData q in data)
                {
                    sw.WriteLine(q);
                }


            }
        }

        /// <summary>
        /// Writes Territoriy
        /// </summary>
        /// <param name="territories"> List of object territory</param>
        /// <param name="fileName"> File path to add the information</param>
        /// <param name="header"> header of the append file</param>
        public static void WriteTerritories(List<Territory> territories, string fileName,
string header)
        {
            using (StreamWriter sw = new StreamWriter(fileName, append: true))
            {
                sw.WriteLine(header);
                sw.WriteLine();
                sw.WriteLine($"{"Adults",-10}|{"Children",-10}|{"Price",-6}|");
                foreach (Territory territory in territories)
                    sw.WriteLine(territory);


                sw.WriteLine();
            }
        }

    }
}
```

TaskUtils.cs:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;

namespace Lab04.App_Code
{
    public static class TaskUtils
    {
        public static List<QueriedData> GetQueriableData(List<Street> streets,
List<Territory> territories)
        {
            // Query 1
            IEnumerable<QueriedData> query =
                from s in streets
                from f in s
                from t in territories
                where f.AdultCount == t.AdultCount && f.ChildCount == t.ChildCount
                select new QueriedData(s.Name, f.Owner, f.AdultCount + f.ChildCount,
f.Space * t.Price);

            return query.ToList();
        }

        /// <summary>
        /// Gets Average per person
        /// </summary>
        /// <param name="data"></param>
        /// <returns></returns>
        public static double GetAverage(List<QueriedData> data)
        {
            // Query 2
            return data.Sum(q => q.Price) / data.Sum(q => q.PeopleCount);

        }

        /// <summary>
        /// Gets households who payed below average per person
        /// </summary>
        /// <param name="data"> List<QueriedData> object </param>
        /// <returns> A new list Queried Object</returns>
        public static List<QueriedData> GetBelowAverageHouseholds(List<QueriedData> data)
        {
            double average = GetAverage(data);

            // Query 3
            IEnumerable<QueriedData> query = data.Where(q => (q.Price / q.PeopleCount) <
average).Select(q => q);

            return query.ToList();
        }

        /// <summary>
        /// Gets households who payed above inputed price
        /// </summary>
        /// <param name="data"> List QueriedData object</param>
        /// <param name="searchPrice"> Price to search by </param>
        /// <returns> List QueriedData object</returns>
        public static List<QueriedData> GetWhoPayedAbove(List<QueriedData> data, double
searchPrice)
        {
            // Query 4
            IEnumerable<QueriedData> query = data.Where(q => q.Price >
searchPrice).Select(q => q);

            return query.ToList();
        }

        /// <summary>
        /// Sort implementation
        /// </summary>
        /// <param name="data"></param>
        public static List<QueriedData> Sort(List<QueriedData> data)
        {
            // Query 5
            return data.OrderByDescending(q => q.Street).ThenByDescending(q =>
q.Owner).ToList();
        }
    }
}
```

css/stylesheet.css:

```
body {
    color: white;
    background: white;
    padding: 0;
    margin: 0;
    display: flex;
    justify-content: center;
    display: flex;
    flex-direction: column;
    justify-content: center;
    align-items: center;
    text-align: center;
    padding: 15px 280px;
    background-color: black;
    min-height: 100vh;
}

td {
    background-color: white;
}

table {
    border: 1px solid;
    border-color: white;
    padding: 5px;
}

td {
    color: black;
    padding: 10px;
}

span {
    font-size: 1.5em;
}
```

Lab04Form.aspx:

```
<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="Lab04Form.aspx.cs"
Inherits="Lab04.Lab04Form" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <link rel="stylesheet" runat="server" media="screen" href="~/css/stylesheet.css" />
    <title></title>
</head>
<body>
    <form id="form1" runat="server">
        <div>
            <asp:Label ID="Label0" runat="server" Text="Intiail Data
(Directory):"></asp:Label>
            <asp:Table ID="Table0" runat="server">
            </asp:Table>
            <br />
            <asp:Label ID="Label2" runat="server" Text="Initial Data (Territory
prices)"></asp:Label>
            <asp:Table ID="Table1" runat="server">
            </asp:Table>
            <br />
            <asp:Label ID="Label4" runat="server" Text="Queried Data"></asp:Label>
            <asp:Table ID="Table4" runat="server">
            </asp:Table>
            <br />
            <asp:Label ID="Label1" runat="server" Text="Below Average Per Person 
Price"></asp:Label>
            <br />
            <br />
            <asp:Table ID="Table2" runat="server">
            </asp:Table>
            Enter Price to search:
            <asp:TextBox ID="TextBox1" runat="server"></asp:TextBox>
            <asp:Button ID="Button1" runat="server" Height="20px" OnClick="Button1_Click" 
Text="Submit" Width="53px" />
            <br />
            Pravalyti Query: <asp:Button ID="Button2" runat="server" Height="20px" 
OnClick="Button2_Click" Text="Clean Query" Width="128px" />
            <br />
            <asp:Label ID="Label3" runat="server" Text="Above X Price 
Households"></asp:Label>
            <br />
            <asp:Table ID="Table3" runat="server">
            </asp:Table>
        </div>
    </form>
</body>
</html>
```

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;
using Lab04.App_Code;

namespace Lab04
{
    public partial class Lab04Form : System.Web.UI.Page
    {
        private string inputDirectory = @"App_Data/Data1";
        private string inputFile = @"App_Data/Territory2.txt";
        private string outputFile = @"App_Data/Output.txt";
        protected void Page_Load(object sender, EventArgs e)
        {
            // Starting Data
            List<Street> streets = 
InOutUtils.ReadStreetData(Server.MapPath(inputDirectory));
            List<Territory> territories = 
InOutUtils.ReadTerritoryData(Server.MapPath(inputFile));
            InOutUtils.CreateFile(Server.MapPath(outputFile));
            InOutUtils.WriteStreets(streets, Server.MapPath(outputFile), "Initial street 
data:");
            InOutUtils.WriteTerritories(territories, Server.MapPath(outputFile), "Initial 
territory data:");
            FillTable(Table0, streets);
            FillTable(Table1, territories);

            // Test Queried Data:
            List<QueriedData> queriedData = TaskUtils.GetQueriableData(streets, 
territories);
            FillTable(Table4, queriedData);
            InOutUtils.WriteQueriedData(queriedData, Server.MapPath(outputFile), "Queried 
Data:");
```

```
            // Task 2
            List<QueriedData> belowAverage = TaskUtils.GetQueriableData(streets,
territories);
            double average = TaskUtils.GetAverage(belowAverage);
            Label1.Text = $"Below Average {average, 0:f} Per Person Price:";
            belowAverage = TaskUtils.GetBelowAverageHouseholds(belowAverage);
            TaskUtils.Sort(belowAverage);
            InOutUtils.WriteQueriedData(belowAverage, Server.MapPath(outputFile), $"Below
Average {average,0:f} Per Person Price:");
            FillTable(Table2, belowAverage);

            // Task 1
            Table3.Rows.Clear();
            Session["priceQuery"] = Session["priceQuery"];
            if (Session["priceQuery"] != null)
            {
                Label3.Text = $"Above {Session["priceQuery"], 0:f} Price Households:";
                List<QueriedData> abovePrice = TaskUtils.GetQueriableData(streets,
territories);
                abovePrice = TaskUtils.GetWhoPayedAbove(abovePrice,
double.Parse(Session["priceQuery"].ToString()));
                TaskUtils.Sort(abovePrice);
                InOutUtils.WriteQueriedData(abovePrice, Server.MapPath(outputFile),
$"Above {Session["priceQuery"],0:f} Price Households:");
                FillTable(Table3, abovePrice);
            }
            else
            {
                Label3.Text = "";
            }
        }

        /// <summary>
        /// Fills Table
        /// </summary>
        /// <param name="table"> Table to add the information </param>
        /// <param name="data"> List of queried data to test the information </param>
        /// <exception cref="Exception"></exception>
        public void FillTable(Table table, List<QueriedData> data)
        {
            try
            {
                TableRow row = new TableRow();
                row.Cells.Add(CreateCell("Street"));
                row.Cells.Add(CreateCell("Owner"));
                row.Cells.Add(CreateCell("People"));
                row.Cells.Add(CreateCell("Price"));
                table.Rows.Add(row);

                foreach (QueriedData q in data)
                    table.Rows.Add(GetRow(q.ToString()));


            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }
        }

        /// <summary>
        /// Fills Table
        /// </summary>
        /// <param name="table"> Table to add the information </param>
        /// <param name="streets"> List of street objects that store families </param>
        /// <exception cref="Exception"></exception>
        public void FillTable(Table table, List<Territory> territories)
        {
            try
            {
                TableRow row = new TableRow();
                row.Cells.Add(CreateCell("Adults"));
                row.Cells.Add(CreateCell("Children"));
                row.Cells.Add(CreateCell("Price"));
                table.Rows.Add(row);

                foreach (Territory territory in territories)
                    table.Rows.Add(GetRow(territory.ToString()));


            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }
        }

        /// <summary>
        /// Fills Table
        /// </summary>
        /// <param name="table"> Table to add the information </param>
        /// <param name="streets"> List of street objects that store families </param>
        /// <exception cref="Exception"></exception>
        public void FillTable(Table table, List<Street> streets)
        {
            try
            {
                foreach (Street street in streets)
                {
                    TableRow streetRow = new TableRow();
                    streetRow.Cells.Add(CreateCell(street.Name));
                    table.Rows.Add(streetRow);

                    TableRow row = new TableRow();
                    row.Cells.Add(CreateCell("Owner"));
                    row.Cells.Add(CreateCell("Adults"));
                    row.Cells.Add(CreateCell("Children"));
                    row.Cells.Add(CreateCell("Space"));
                    table.Rows.Add(row);

                    for (int i = 0; i < street.Count; i++)
                    {
                        table.Rows.Add(GetRow(street.Get(i).ToString()));
                    }
                }
            }
            catch (Exception ex)
            {
                throw new Exception(string.Format(" Method {0}, Message {1}, Source {2}",
ex.TargetSite, ex.Message, ex.Source));
            }
        }

        /// <summary>
        /// Creates TableRow from string object
        /// </summary>
        /// <param name="test"> text</param>
        /// <returns>Family object</returns>
        public TableRow GetRow(string text)
        {
            TableRow row = new TableRow();
            string[] elements = text.ToString().Split("|".ToCharArray(),
StringSplitOptions.RemoveEmptyEntries);
            foreach (string element in elements)
                row.Cells.Add(CreateCell(element.Trim()));

            return row;
        }

        /// <summary>
        /// Creates TableCell from text to speed up TableCell creation
        /// </summary>
        /// <param name="text">string text to add to the table cell</param>
        /// <returns>TableCell class object</returns>
        protected static TableCell CreateCell(string text)
        {
            TableCell cell = new TableCell();
            cell.Text = text;
            return cell;
        }

        /// <summary>
        /// Price to search submit
        /// </summary>
        protected void Button1_Click(object sender, EventArgs e)
        {
            Session["priceQuery"] = TextBox1.Text;
            Response.Redirect("Lab04Form.aspx");

        }
        protected void Button2_Click(object sender, EventArgs e)
        {
            Session["priceQuery"] = null;
            Response.Redirect("Lab04Form.aspx");
        }
    }
}
```

## 5.7. Pradiniai duomenys ir rezultatai

```
Pradiniai duomenys 1:
Tikslas – tikrinti kaip veikia programa su keliais failais ir atitinkančiais
duomenimis.

Aplankalas Data1:
Sheet1.txt:

Gatvė 1
Pavarde1; 1; 0; 100.5
Pavarde3; 2; 0; 60
Pavarde5; 2; 1; 98.5
Pavarde6; 1; 0; 120.1

Sheet2.txt:

Gatvė 2
Pavarde4; 2; 1; 70
Pavarde2; 1; 2; 50

Sheet3.txt:
```

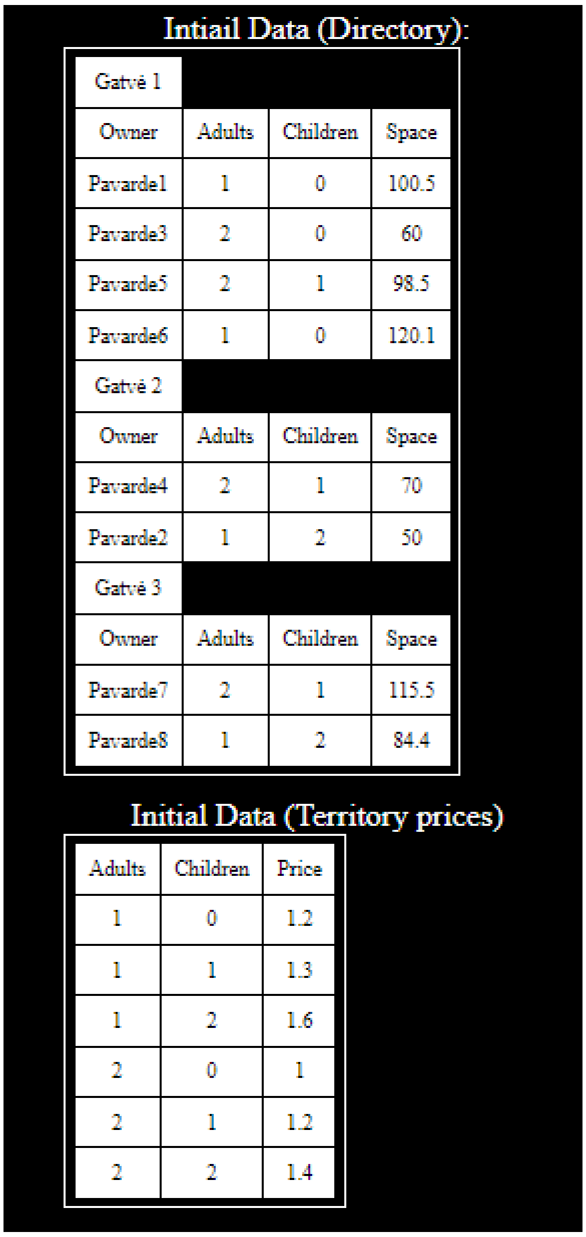
```
Gatvė 3
Pavarde7; 2; 1; 115.5
Pavarde8; 1; 2; 84.4

Territory1.txt:

1; 0; 1.2
1; 1; 1.3
1; 2; 1.6
2; 0; 1
2; 1; 1.2
2; 2; 1.4
```

Rezultatai 1

Vartotojo sąsaja (ieškant kainos virš 100):

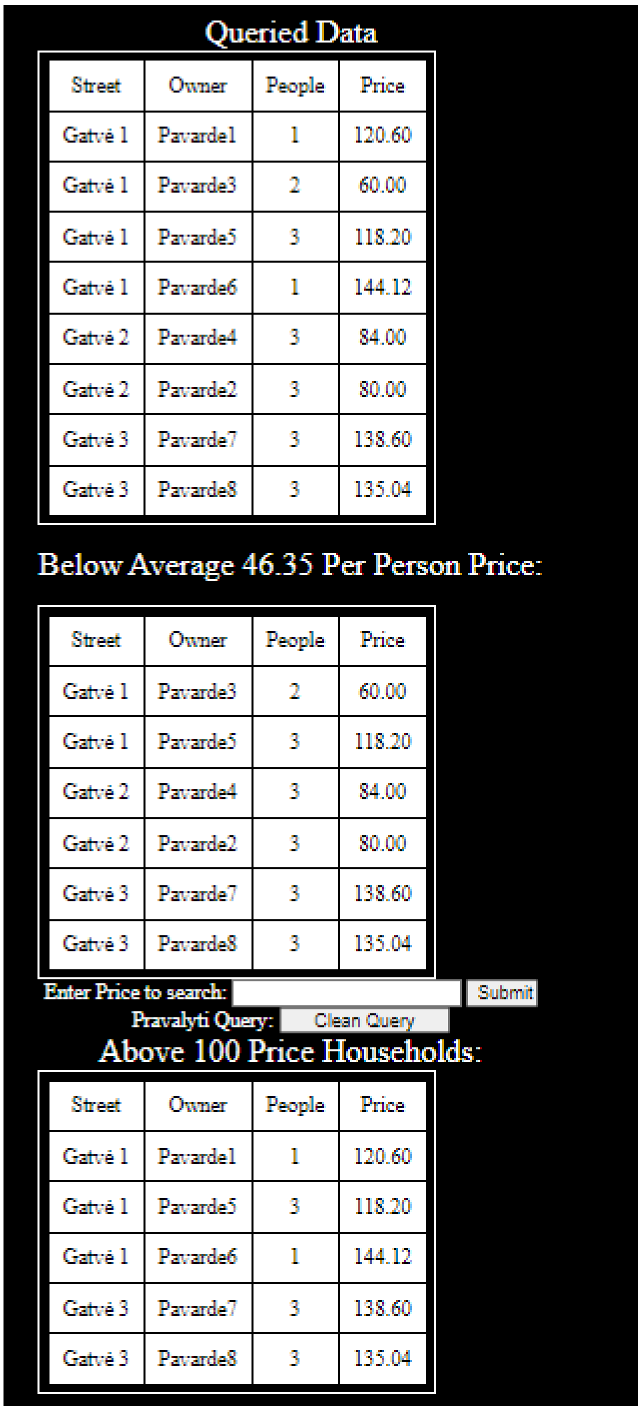


Intiail Data (Directory):

| Gatvė 1 | | | |
|---|---|---|---|
| Owner | Adults | Children | Space |
| Pavarde1 | 1 | 0 | 100.5 |
| Pavarde3 | 2 | 0 | 60 |
| Pavarde5 | 2 | 1 | 98.5 |
| Pavarde6 | 1 | 0 | 120.1 |
| Gatvė 2 | | | |
| Owner | Adults | Children | Space |
| Pavarde4 | 2 | 1 | 70 |
| Pavarde2 | 1 | 2 | 50 |
| Gatvė 3 | | | |
| Owner | Adults | Children | Space |
| Pavarde7 | 2 | 1 | 115.5 |
| Pavarde8 | 1 | 2 | 84.4 |

Initial Data (Territory prices)

| Adults | Children | Price |
|---|---|---|
| 1 | 0 | 1.2 |
| 1 | 1 | 1.3 |
| 1 | 2 | 1.6 |
| 2 | 0 | 1 |
| 2 | 1 | 1.2 |
| 2 | 2 | 1.4 |



Queried Data

| Street | Owner | People | Price |
|---|---|---|---|
| Gatvė 1 | Pavarde1 | 1 | 120.60 |
| Gatvė 1 | Pavarde3 | 2 | 60.00 |
| Gatvė 1 | Pavarde5 | 3 | 118.20 |
| Gatvė 1 | Pavarde6 | 1 | 144.12 |
| Gatvė 2 | Pavarde4 | 3 | 84.00 |
| Gatvė 2 | Pavarde2 | 3 | 80.00 |
| Gatvė 3 | Pavarde7 | 3 | 138.60 |
| Gatvė 3 | Pavarde8 | 3 | 135.04 |

Below Average 46.35 Per Person Price:

| Street | Owner | People | Price |
|---|---|---|---|
| Gatvė 1 | Pavarde3 | 2 | 60.00 |
| Gatvė 1 | Pavarde5 | 3 | 118.20 |
| Gatvė 2 | Pavarde4 | 3 | 84.00 |
| Gatvė 2 | Pavarde2 | 3 | 80.00 |
| Gatvė 3 | Pavarde7 | 3 | 138.60 |
| Gatvė 3 | Pavarde8 | 3 | 135.04 |

Above 100 Price Households:

| Street | Owner | People | Price |
|---|---|---|---|
| Gatvė 1 | Pavarde1 | 1 | 120.60 |
| Gatvė 1 | Pavarde5 | 3 | 118.20 |
| Gatvė 1 | Pavarde6 | 1 | 144.12 |
| Gatvė 3 | Pavarde7 | 3 | 138.60 |
| Gatvė 3 | Pavarde8 | 3 | 135.04 |

```
Output.txt:

Initial street data:

Gatvė 1
-----------------------------------------------------------------------------
Owner                |Adults     |  Children| Space|
Pavarde1             |          1|         0| 100.5|
Pavarde3             |          2|         0|    60|
Pavarde5             |          2|         1|  98.5|
Pavarde6             |          1|         0| 120.1|

Gatvė 2
-----------------------------------------------------------------------------
Owner                |Adults     |  Children| Space|
Pavarde4            |         2|         1|    70|
Pavarde2            |         1|         2|    50|

Gatvė 3
----------------------------------------------------------------------------------
Owner               |Adults    |  Children| Space|
Pavarde7            |         2|         1| 115.5|
Pavarde8            |         1|         2|  84.4|

Initial territory data:

Adults    |Children  |Price |
         1|         0|   1.2|
         1|         1|   1.3|
         1|         2|   1.6|
         2|         0|     1|
         2|         1|   1.2|
         2|         2|   1.4|

Queried Data:

----------------------------------------------------------------------------------
Street              |Owner               |Children       |Space     |
Gatvė 1             |Pavarde1            |              1|    120.60
Gatvė 1             |Pavarde3            |              2|     60.00
Gatvė 1             |Pavarde5            |              3|    118.20
Gatvė 1             |Pavarde6            |              1|    144.12
Gatvė 2             |Pavarde4            |              3|     84.00
Gatvė 2             |Pavarde2            |              3|     80.00
Gatvė 3             |Pavarde7            |              3|    138.60
Gatvė 3             |Pavarde8            |              3|    135.04
Below Average 46.35 Per Person Price:

----------------------------------------------------------------------------------
Street              |Owner               |Children       |Space     |
Gatvė 1             |Pavarde3            |              2|     60.00
Gatvė 1             |Pavarde5            |              3|    118.20
Gatvė 2             |Pavarde4            |              3|     84.00
Gatvė 2             |Pavarde2            |              3|     80.00
Gatvė 3             |Pavarde7            |              3|    138.60
Gatvė 3             |Pavarde8            |              3|    135.04
```

Pradiniai duomenys 12
Tikslas – tikrinti kaip veikia programa su tusčiu Territory.txt file. Jokių sutapimų neturėtų būti ir Queried Data turėtų būti tusčias.

Aplankalas Data1:
Sheet1.txt:

```
Gatvė 1
Pavarde1; 1; 0; 100.5
Pavarde3; 2; 0; 60
Pavarde5; 2; 1; 98.5
Pavarde6; 1; 0; 120.1
```

Sheet2.txt:

```
Gatvė 2
Pavarde4; 2; 1; 70
Pavarde2; 1; 2; 50
```

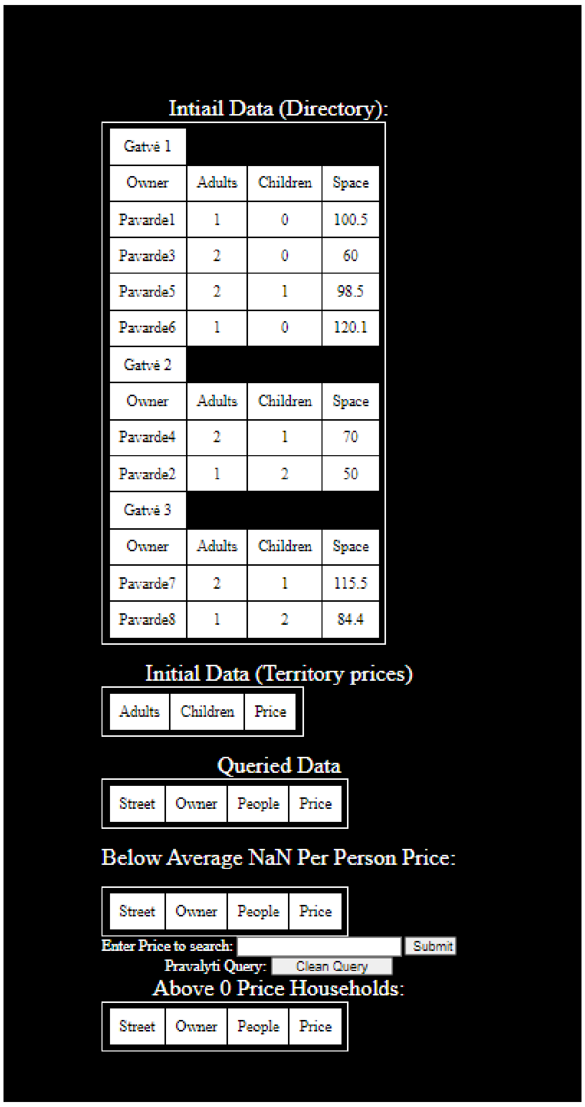
Sheet3.txt:

```
Gatvė 3
Pavarde7; 2; 1; 115.5
Pavarde8; 1; 2; 84.4
```

(Failas tusčias)
Territory1.txt:

Rezultatai 1

Vartotojo Sąsaja:



Intiail Data (Directory):

| | | | |
|---|---|---|---|
| Gatvė 1 | | | |
| Owner | Adults | Children | Space |
| Pavarde1 | 1 | 0 | 100.5 |
| Pavarde3 | 2 | 0 | 60 |
| Pavarde5 | 2 | 1 | 98.5 |
| Pavarde6 | 1 | 0 | 120.1 |
| Gatvė 2 | | | |
| Owner | Adults | Children | Space |
| Pavarde4 | 2 | 1 | 70 |
| Pavarde2 | 1 | 2 | 50 |
| Gatvė 3 | | | |
| Owner | Adults | Children | Space |
| Pavarde7 | 2 | 1 | 115.5 |
| Pavarde8 | 1 | 2 | 84.4 |

Initial Data (Territory prices)

| Adults | Children | Price |
|---|---|---|

Queried Data

| Street | Owner | People | Price |
|---|---|---|---|

Below Average NaN Per Person Price:

| Street | Owner | People | Price |
|---|---|---|---|

Enter Price to search: Submit
Pravalyti Query: Clean Query

Above 0 Price Households:

| Street | Owner | People | Price |
|---|---|---|---|

Output.txt:

Initial street data:

```
Gatvė 1
--------------------------------------------------------------------------------
Owner              |Adults    |  Children| Space|
Pavarde1           |         1|         0| 100.5|
Pavarde3           |         2|         0|    60|
Pavarde5           |         2|         1|  98.5|
Pavarde6           |         1|         0| 120.1|

Gatvė 2
--------------------------------------------------------------------------------
Owner              |Adults    |  Children| Space|
Pavarde4           |         2|         1|    70|
Pavarde2           |         1|         2|    50|

Gatvė 3
--------------------------------------------------------------------------------
Owner              |Adults    |  Children| Space|
Pavarde7           |         2|         1| 115.5|
Pavarde8           |         1|         2|  84.4|

Initial territory data:

Adults    |Children  |Price |

Queried Data:

--------------------------------------------------------------------------------
Street             |Owner               |Children       |Space     |
Below Average NaN Per Person Price:

--------------------------------------------------------------------------------
Street             |Owner               |Children       |Space     |
Above 0 Price Households:

--------------------------------------------------------------------------------
Street             |Owner               |Children       |Space     |
```

## 5.8. Dėstytojo pastabos