

Kauno technologijos universitetas
Informatikos fakultetas

Objektinis programavimas 2 (P175B123)

Laboratorinių darbų ataskaita

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Studentas

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Dėstytojas

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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 grandinė (pirmas pažįsta antrą, antras pažįsta trečią, trečias pažįsta ketvirtą, tuomet pirmas gali susipažinti su ketvirtu), kuri veda iki nepažįstamo moksleivio. Pirmame tekstiname faile 'U31DUOM.TXT' apie moksleivius pateikta tokia informacija: moksleivio vardas, jo pažįstamų moksleivių kiekis, pažįstamų moksleivių vardai. Kiekvienam moksleiviui tekstiname faile yra skirta po vieną eilutę. Antrame tekstiname 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

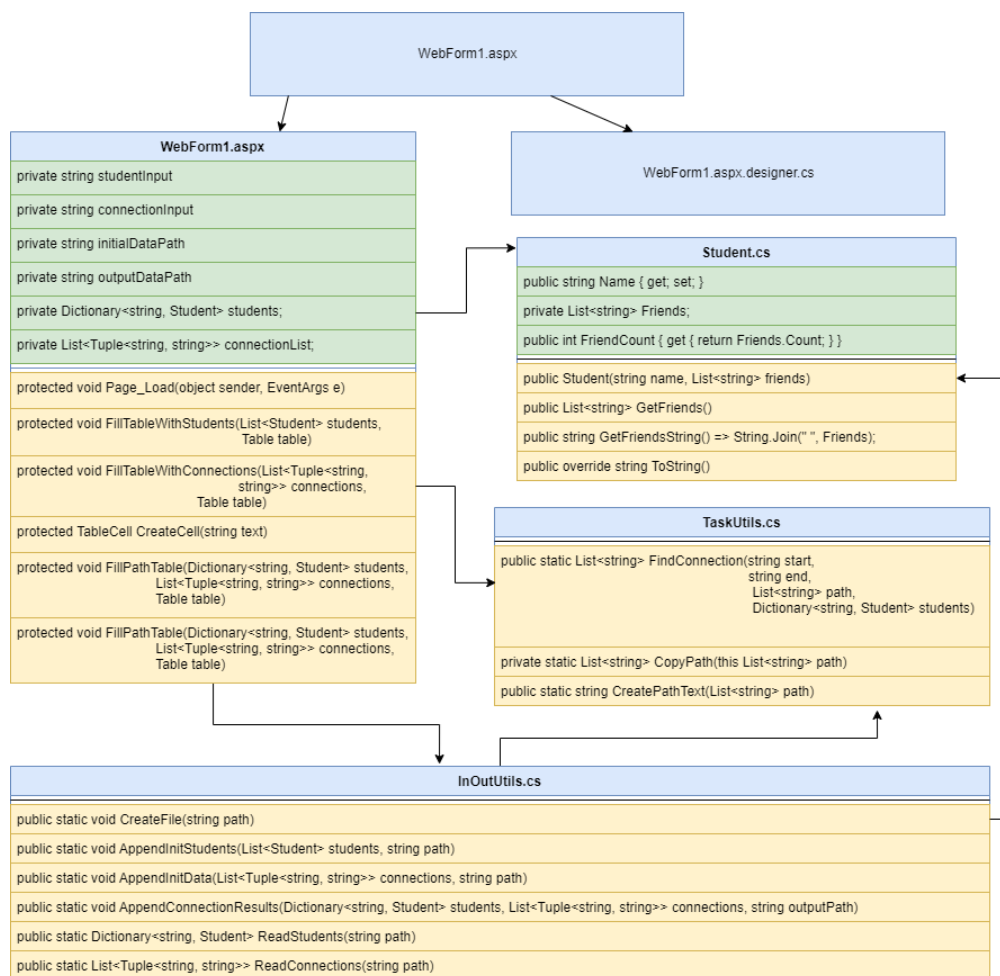
Studentų Ieškomi Junginiai: ConnectionLabel
### ConnectionTable

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



1.5. Programos vartotojo vadovas

Atsidarius programą, programa nuskaity 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 Tuples(string, string)</returns>
public static List<Tuple<string, string>> ReadConnections(string path)
{
    List<Tuple<string, string>> connctions = new List<Tuple<string, string>>();
    using (StreamReader sr = new StreamReader(path))
    {
        string line;
        while ((line = sr.ReadLine()) != null)
        {
            string[] elements = line.Split(' ');
            connctions.Add(new Tuple<string, string>(elements[0], elements[1]));
        }
    }

    return connctions;
}
}
}

```

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:

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

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:

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

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;
```

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

div#body

LAB02 U16

Tax Info U16a.txt

Browse...

Every Citizen Tax Data U16b.txt

Browse...

Submit New Data

U16a.txt Initial data:

###

U16b.txt Initial data:

###

All Citizen taxes over the months

###

[AverageTax]

[TotalTaxSum]

Above Average Tax:

###

Filtered data:

###

Tax Code:

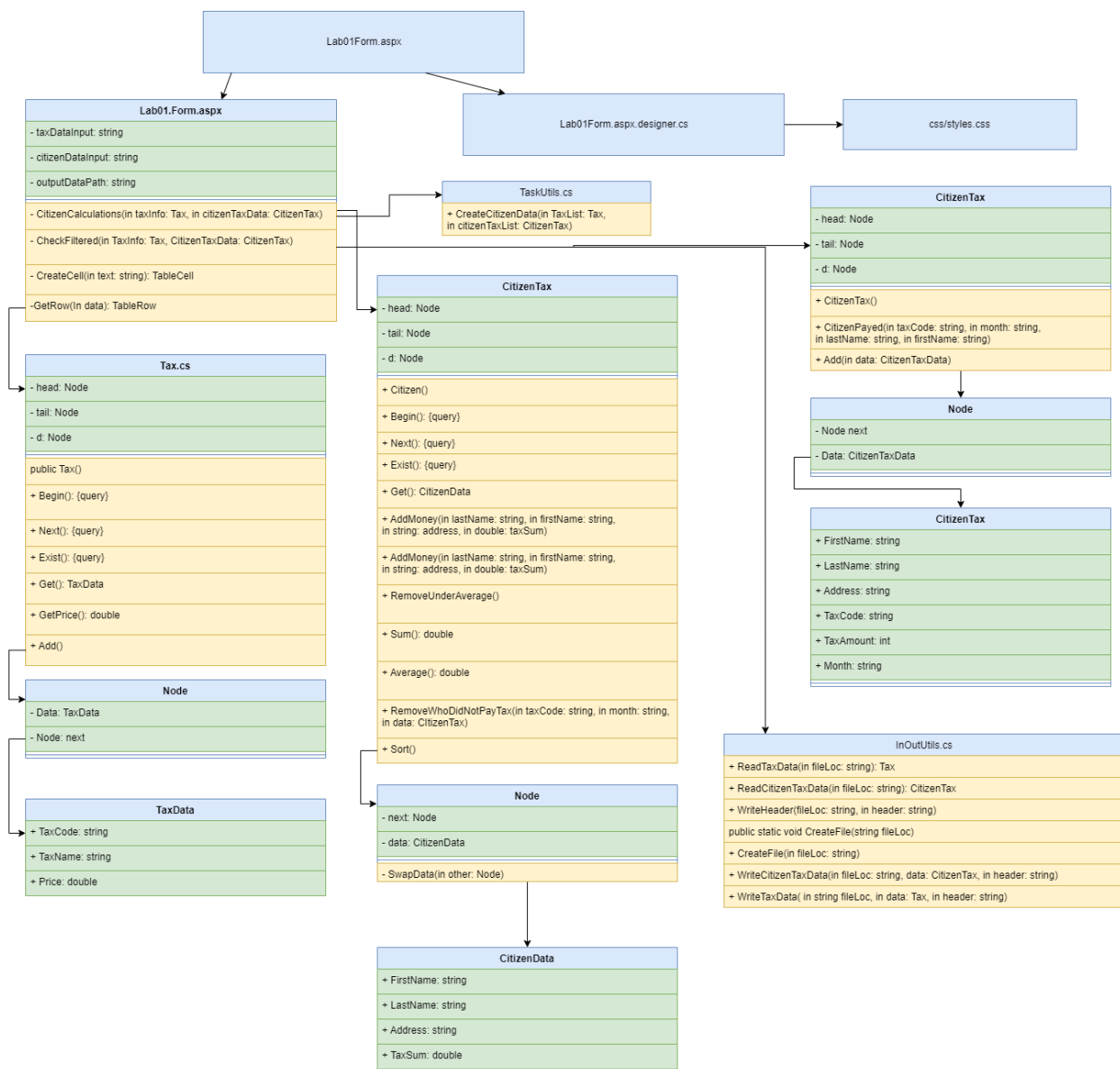
Month:

Submit

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



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;

        /// <summary>
        /// Constructor
        /// </summary>
    }
}

```

```

public Citizen()
{
    head = null;
    tail = null;
}

private Node d;
/** 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>
/// Adds money to the specified citizen using his FirstName and Last name.
/// If the citizen does not exists, adds him to the LinkedList
/// </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>
/// <param name="taxSum">Tax sum to add to his TOTAL</param>
public void AddMoney(string lastName, string firstName, string address, double
taxSum)
{
    // 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)
        {
            curr.TaxSum += taxSum;
            return;
        }
    }

    // If No citizen was found, adds the citizen to Linked List
    if (head == null)
    {
        head = new Node(lastName, firstName, address);
        head.Data.TaxSum = taxSum;
        tail = head;
    }
    else
    {
        tail.next = new Node(lastName, firstName, address);
        tail = tail.next;
        tail.Data.TaxSum = taxSum;
    }
}

/// <summary>
/// Removes citizens from linked list who payed below 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;
    }
    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 separately
    /// </summary>
    class Node
    {
        public CitizenData Data { get; set; }
        public Node next { get; set; }

        /// <summary>
        /// Constructor
        /// </summary>
        /// <param name="data">CitizenData pointer</param>
        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;
        }
    }
}
}

```

CitizenTaxData.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;

        /// <summary>
        /// Constructor
        /// </summary>
        public Citizen()
        {
            head = null;
            tail = null;
        }

        private Node d;
        /** 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>
        /// Adds money to the specified citizen using his FirstName and Last name.
        /// If the citizen does not exists, adds him to the LinkedList
        /// </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>
        /// <param name="taxSum">Tax sum to add to his TOTAL</param>
        public void AddMoney(string lastName, string firstName, string address, double
taxSum)
        {
            // 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)
                {
                    curr.TaxSum += taxSum;
                    return;
                }
            }

            // If No citizen was found, adds the citizen to Linked List
            if (head == null)
```

```

    {
        head = new Node(lastName, firstName, address);
        head.Data.TaxSum = taxSum;
        tail = head;
    }
    else
    {
        tail.next = new Node(lastName, firstName, address);
        tail = tail.next;
        tail.Data.TaxSum = taxSum;
    }
}

/// <summary>
/// Removes citizens from linked list who payed below 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;
    }
    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 paid 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(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;
    }
}
}
}

```

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
    tax
    /// </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);
                tail = head;
            }
            else
            {

```

```

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

```

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

```

TasUtils.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;
        }
    }
}
```

InOutUtils.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;
}
}
}

```

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; Benzinai; 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:
 No file chosen

Every Citizen Tax Data U16b.txt:
 No file chosen

Prikabinamo U16a.txt failą:

Plaese Upload remaining data files

Tax Info U16a.txt:
 No file chosen

Every Citizen Tax Data U16b.txt:
 No file chosen

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:

No file chosen

Every Citizen Tax Data U16b.txt:

No file chosen

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 |

U16a.txt Initial data:

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:

Prafiltruojame 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.

3. Bendrinės klasės ir testavimas (L3)

3.1. Darbo užduotis

3.2. Grafinės vartotojo sąsajos schema

3.3. Sąsajoje panaudotų komponentų keičiamos savybės

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

3.4. Klasių diagrama

3.5. Programos vartotojo vadovas

3.6. Programos tekstas

3.7. Pradiniai duomenys ir rezultatai

3.8. Dėstytojo pastabos

4. Polimorfizmas ir išimčių valdymas (L4)

4.1. Darbo užduotis

4.2. Grafinės vartotojo sąsajos schema

4.3. Sąsajoje panaudotų komponentų keičiamos savybės

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

4.4. Klasių diagrama

4.5. Programos vartotojo vadovas

4.6. Programos tekstas

4.7. Pradiniai duomenys ir rezultatai

4.8. Dėstytojo pastabos

5. Deklaratyvusis programavimas (L5)

5.1. Darbo užduotis

5.2. Grafinės vartotojo sąsajos schema

5.3. Sąsajoje panaudotų komponentų keičiamos savybės

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

5.4. Klasių diagrama

5.5. Programos vartotojo vadovas

5.6. Programos tekstas

5.7. Pradiniai duomenys ir rezultatai

5.8. Dėstytojo pastabos