A logo with text and a horse and a book

Description automatically generated

**VILNIUS UNIVERSITY  
ŠIAULIAI ACADEMY**

BACHELOR PROGRAMME SOFTWARE ENGINEERING

Object-Oriented Programming (OOP)

**C# Final Project**

Github report: https://github.com/Sifaurrahman/FileSyncNetScout

Student : MD Sifaur Rahman

Leacturer : Donatas Dervinis, Assist. Prof., Dr.

Šiauliai, 2025

1. **Purpose of Project:**

**FileSyncNetScout** = A Distributed File Indexing System Using C#

This C# console-based project demonstrates inter-process communication, multithreading, and CPU core control through a Master-Agent architecture using named pipes.

1. **System Overview**

The system consists of three console applications:

\*\*AgentA\*\* scans `.txt` files and sends word counts via pipe `agent1`

\*\*AgentB\*\* performs the same via pipe `agent2`

\*\*Master\*\* receives data from both agents, merges and displays word count index

Each component runs on a dedicated CPU core.

1. **Core Features**

* Word Indexing
* Multithreading
* Named Pipe Communication
* CPU Affinity via `Processor.ProcessorAffinity`
* Git-based Versioning

1. **Architecture Summary**

`AgentA` and `AgentB`: Read `.txt` files, count words, send data through named pipes

`Master`: Uses 2 threads to read from pipes concurrently, merges and prints final result.

1. **Technology Stack**

|  |  |
| --- | --- |
| **Technology** | **Used For** |
| C# (.NET 7) | All 3 console apps |
| Named Pipes | Agent-Master communication |
| Threads | Concurrent file I/O and pipe listening |
| CPU Affinity | Core isolation of processes |
| VS Code + Git | Development + version control |

1. **CPU Affinity Logic**

To run each app on its own CPU core:

```csharp

Process current = Process.GetCurrentProcess();

current.ProcessorAffinity = (IntPtr)(1 << N);

1. **Screenshots**

**A screenshot of a computer program

AI-generated content may be incorrect.**

1. **UML Diagram:**

A diagram of a computer system

AI-generated content may be incorrect.

1. **Challenges and Resolutions**

|  |  |
| --- | --- |
| **Challenge** | **How I solve it** |
| Named pipe connection errors | Ensured Master starts before Agents |
| Null input warning in Console.ReadLine() | Used null-check with ?? "" |
| CPU Affinity warning | Added correct using System.Diagnostics |