

JURNAL MODUL 6
DESIGN BY CONTRACT DAN DEFENSIVE
PROGRAMMING



Nama :

Alya Rabani (2311104076)

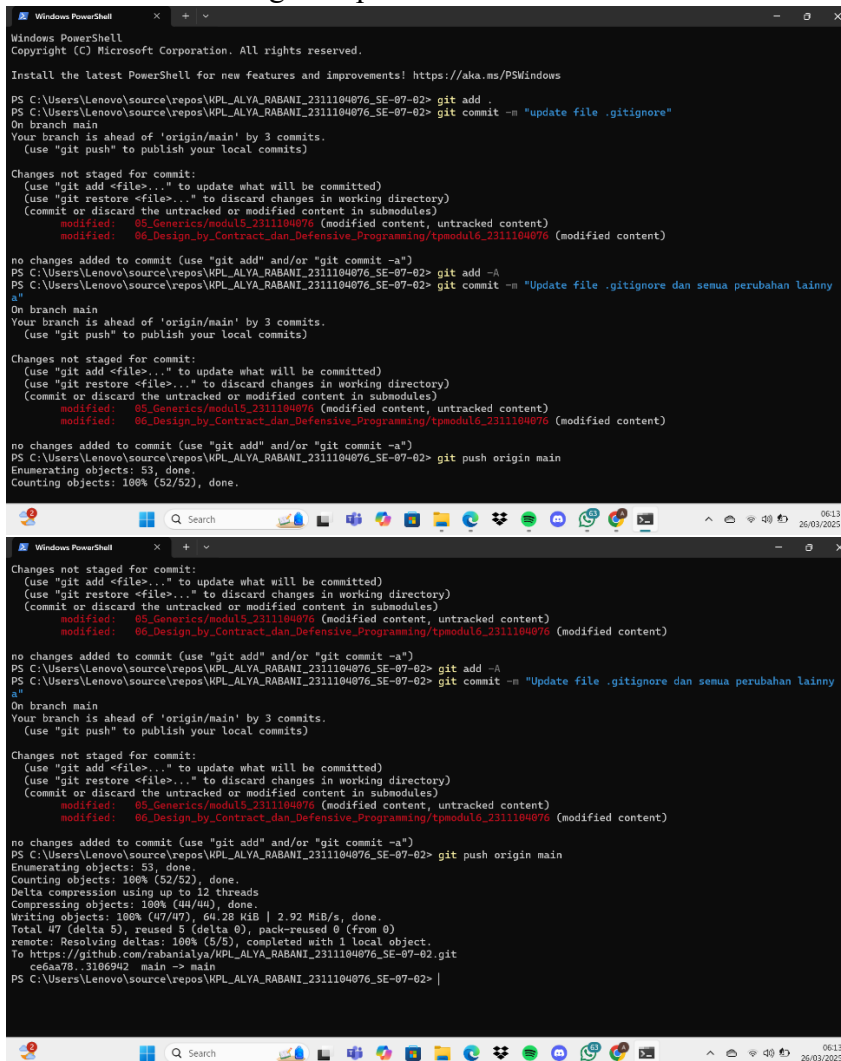
Dosen :

YUDHA ISLAMI SULISTYA

PROGRAM STUDI S1 REKAYASA PERANGKAT
LUNAK
TELKOM UNIVERSITY PURWOKERTO
2025

1. Melakukan git commit pada project yang dibuat

Setelah membuat project console app disini saya membuat commit untuk menambahkan file .gitignore karena sebelumnya saya sudah pernah membuat .gitignore maka saya mengcopy file .gitignore baru dan memasukan ke file lama kemudian saya commit tetapi ada beberapa perubahan pada sebuah dua file dan belum di add sepenuhnya. Jadi saya menambahkan perubahan yang belum ditambahkan itu kemudian commit lagi dan push.



```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02> git add .
PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02> git commit -m "update file .gitignore"
On branch main
Your branch is ahead of 'origin/main' by 3 commits.
(use "git push" to publish your local commits)

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
  (commit or discard the untracked or modified content in submodules)
    modified:   05_Generics/modul5_2311180476 (modified content, untracked content)
    modified:   06_Design_by_Contract_dan_Defensive_Programming/tpmodul6_2311180476 (modified content)

no changes added to commit (use "git add" and/or "git commit -a")
PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02> git add -A
PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02> git commit -m "Update file .gitignore dan semua perubahan lainnya"
On branch main
Your branch is ahead of 'origin/main' by 3 commits.
(use "git push" to publish your local commits)

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
  (commit or discard the untracked or modified content in submodules)
    modified:   05_Generics/modul5_2311180476 (modified content, untracked content)
    modified:   06_Design_by_Contract_dan_Defensive_Programming/tpmodul6_2311180476 (modified content)

no changes added to commit (use "git add" and/or "git commit -a")
PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02> git push origin main
Enumerating objects: 53, done.
Counting objects: 100% (52/52), done.

PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02>

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
  (commit or discard the untracked or modified content in submodules)
    modified:   05_Generics/modul5_2311180476 (modified content, untracked content)
    modified:   06_Design_by_Contract_dan_Defensive_Programming/tpmodul6_2311180476 (modified content)

no changes added to commit (use "git add" and/or "git commit -a")
PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02> git add -A
PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02> git commit -m "Update file .gitignore dan semua perubahan lainnya"
On branch main
Your branch is ahead of 'origin/main' by 3 commits.
(use "git push" to publish your local commits)

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
  (commit or discard the untracked or modified content in submodules)
    modified:   05_Generics/modul5_2311180476 (modified content, untracked content)
    modified:   06_Design_by_Contract_dan_Defensive_Programming/tpmodul6_2311180476 (modified content)

no changes added to commit (use "git add" and/or "git commit -a")
PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02> git push origin main
Enumerating objects: 53, done.
Counting objects: 100% (52/52), done.
Delta compression using up to 12 threads
Compressing objects: 100% (44/44), done.
Writing objects: 100% (47/47), 61.28 KiB | 2.92 MiB/s, done.
Total 47 (delta 5), reused 5 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (5/5), completed with 1 local object.
To https://github.com/rabaniaalya/KPL_ALYA_RABANI_2311180476_SE-07-02.git
ce6aa78..3106942 main -> main
PS C:\Users\lenovo\source\repos\KPL_ALYA_RABANI_2311180476_SE-07-02> |
```

2. Menambahkan kode awal SayaTubeVideo dan SayaTubeUser

Pada class SayaTubeVideo terdapat implementasi design by contract konsep DbC dapat diterapkan dengan menggunakan Debug.Assert() untuk memastikan bahwa input dan output sesuai dengan yang diharapkan. Kemudian untuk mencegah kesalahan digunakan defensive programming seperti AddVideo(SayaTubeVideo video) pada class SayaTubeUser dimana ini digunakan agar tidak menambahkan objek null.

```

1  using System;
2  using System.Collections.Generic;
3
4  6 references
5  class SayaTubeVideo
6  {
7      private int id;
8      private string title;
9      private int playCount;
10
11      1 reference
12      public string Title { get { return title; } }
13      1 reference
14      public int PlayCount { get { return playCount; } }
15
16      1 reference
17      public SayaTubeVideo(string title)
18      {
19          Random random = new Random();
20          this.id = random.Next(10000, 99999);
21          this.title = title;
22          this.playCount = 0;
23      }
24
25      0 references
26      public void IncreasePlayCount(int count)
27      {
28          playCount += count;
29      }
30
31      0 references
32      public void PrintVideoDetails()
33      {
34          Console.WriteLine($"ID: {id}");
35          Console.WriteLine($"Title: {title}");
36          Console.WriteLine($"Play Count: {playCount}\n");
37      }
38
39  }
40
41  0 references
42  class Program
43  {
44      0 references
45      static void Main()
46      {
47          SayaTubeUser user = new SayaTubeUser("Alya Rabani");
48
49          List<string> filmTitles = new List<string>
50          {
51              "Review Film Inception oleh Alya Rabani",
52              "Review Film Interstellar oleh Alya Rabani",
53              "Review Film Anora oleh Alya Rabani",
54              "Review Film The Dark Knight oleh Alya Rabani",
55              "Review Film Parasite oleh Alya Rabani",
56              "Review Film The Godfather oleh Alya Rabani",
57              "Review Film Fight Club oleh Alya Rabani",
58              "Review Film Dirty dancing oleh Alya Rabani",
59              "Review Film A Brighter Summer Days oleh Alya Rabani",
60              "Review Film The Substance oleh Alya Rabani"
61          };
62
63          foreach (var title in filmTitles)
64          {
65              SayaTubeVideo video = new SayaTubeVideo(title);
66              user.AddVideo(video);
67          }
68
69          user.PrintAllVideoPlaycount();
70      }
71  }

```

```

class SayaTubeUser
{
    private int id;
    private List<SayaTubeVideo> uploadedVideos;
    2 references
    public string Username { get; private set; }

    1 reference
    public SayaTubeUser(string username)
    {
        Random random = new Random();
        this.id = random.Next(10000, 99999);
        this.Username = username;
        this.uploadedVideos = new List<SayaTubeVideo>();
    }

    1 reference
    public void AddVideo(SayaTubeVideo video)
    {
        uploadedVideos.Add(video);
    }

    0 references
    public int GetTotalVideoPlayCount()
    {
        int total = 0;
        foreach (var video in uploadedVideos)
        {
            total += video.PlayCount;
        }
        return total;
    }

    1 reference
    public void PrintAllVideoPlaycount()
    {
        Console.WriteLine($"User: {Username}");
        for (int i = 0; i < uploadedVideos.Count; i++)
        {
            Console.WriteLine($"Video {i + 1} judul: {uploadedVideos[i].Title}"); // Gunakan getter
        }
    }
}

```

Output yang dihasilkan:

```

Microsoft Visual Studio Debu: x + -
User: Alya Rabani
Video 1 judul: Review Film Inception oleh Alya Rabani
Video 2 judul: Review Film Interstellar oleh Alya Rabani
Video 3 judul: Review Film Anora oleh Alya Rabani
Video 4 judul: Review Film The Dark Knight oleh Alya Rabani
Video 5 judul: Review Film Parasite oleh Alya Rabani
Video 6 judul: Review Film The Godfather oleh Alya Rabani
Video 7 judul: Review Film Fight Club oleh Alya Rabani
Video 8 judul: Review Film Dirty dancing oleh Alya Rabani
Video 9 judul: Review Film A Brighter Summer Days oleh Alya Rabani
Video 10 judul: Review Film The Substance oleh Alya Rabani

C:\Users\Lenovo\source\repos\KPL_ALYA_RABANI_2311104076_SE-07-02\06_Design_by_Contract_dan_Defensive_Programming\tjmodul
6_2311104076\tjmodul6_2311104076\bin\Debug\net8.0\tjmodul6_2311104076.exe (process 23280) exited with code 0 (0x0).
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .]

```

3. Melakukan commit kedua

```
C:\Users\Lenovo\source\repos\KPL_ALYA_RABANI_2311104076_SE-07-02\06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076>
git add .

C:\Users\Lenovo\source\repos\KPL_ALYA_RABANI_2311104076_SE-07-02\06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076>
git commit -m "menambahkan dua class SayaTubeVideo dan SayaTubeUser"
[main 730cb5c] menambahkan dua class SayaTubeVideo dan SayaTubeUser
24 files changed, 158 insertions(+), 6 deletions(-)
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076/.vs\tjmodul6_2311104076/FileContentIndex/7fc9
ed57-6919-4e5b-a105-292d4fd2f9ec.vsix
delete mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076/.vs\tjmodul6_2311104076/FileContentIndex/ff89
ed66-fb1a-48c3-84e1-f730eb29bd04.vsix
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\bin\Debug\net8.0\tjmodul6
_2311104076.deps.json
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\bin\Debug\net8.0\tjmodul6
_2311104076.dll
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\bin\Debug\net8.0\tjmodul6
_2311104076.exe
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\bin\Debug\net8.0\tjmodul6
_2311104076.pdb
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\bin\Debug\net8.0\tjmodul6
_2311104076.runtimeconfig.json
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\obj\Debug\net8.0\apphost.
exe
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\obj\Debug\net8.0\ref\tjmo
dul6_2311104076.dll
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\obj\Debug\net8.0\refint\t
jmodul6_2311104076.dll
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\obj\Debug\net8.0\tjmodul6
_2311104076.csproj.BuildWithSkipAnalyzers
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\obj\Debug\net8.0\tjmodul6
_2311104076.csproj.CoreCompileInputs.cache
create mode 100644 06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076\tjmodul6_2311104076\obj\Debug\net8.0\tjmodul6

C:\Users\Lenovo\source\repos\KPL_ALYA_RABANI_2311104076_SE-07-02\06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076>
git push origin main
Enumerating objects: 51, done.
Counting objects: 100% (50/50), done.
Delta compression using up to 12 threads
Compressing objects: 100% (31/31), done.
Writing objects: 100% (35/35), 83.14 KiB | 6.93 MiB/s, done.
Total 35 (delta 9), reused 2 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (9/9), completed with 8 local objects.
To https://github.com/rabaniaalya/KPL_ALYA_RABANI_2311104076_SE-07-02.git
3106942..730cb5c main -> main
```

4. Menambahkan implementasi Design By Contract

Pada soal ini kita menambahkan precondition, exception, postcondition dan menguji ketiganya. Penerapan ketiga metode ini untuk memastikan program berjalan sesuai prinsip Design by Contract. Pada bagian precondition, dilakukan pemeriksaan panjang title dan username sebelum objek dibuat, serta memastikan playCount yang ditambahkan tidak negatif dan tidak melebihi batas 25 juta. Selain itu, video yang ditambahkan ke user harus tidak null dan memiliki playCount yang valid. Untuk exception handling, digunakan try-catch saat menambahkan playCount guna menangani OverflowException, sehingga jika terjadi overflow, program tetap dapat berjalan tanpa error fatal. Selain itu, error juga ditangkap di dalam Main() agar program tidak langsung berhenti ketika terjadi kesalahan. Pada bagian postcondition, metode PrintAllVideoPlaycount() telah dibatasi agar hanya menampilkan maksimal 8 video, sesuai dengan aturan yang ditetapkan dalam kontrak desain program.

```

using System;
using System.Collections.Generic;
using System.Linq.Expressions;

8 references
class SayaTubeVideo
{
    private int id;
    private string title;
    private int playCount;

    1 reference
    public string Title { get { return title; } } //perubahan
    2 references
    public int PlayCount { get { return playCount; } } //perubahan

    2 references
    public SayaTubeVideo(string title)
    {
        if (title == null) throw new ArgumentNullException("Judul tidak boleh null"); //perubahan
        if (title.Length > 200) throw new ArgumentException("Judul tidak boleh lebih dari 200 karakter"); //perubahan

        Random random = new Random();
        this.id = random.Next(10000, 99999);
        this.title = title;
        this.playCount = 0;
    }

    2 references
    public void IncreasePlayCount(int count)
    {
        if (count < 0) throw new ArgumentException("Play count tidak boleh negatif");
        if (count > 25000000) throw new ArgumentException("Maksimum play count adalah 25.000.000");

        checked
        {
            try
            {
                playCount += count;
            }
            catch (OverflowException)
            {
                Console.WriteLine("ERROR: Play count melebihi batas integer.");
            }
        }
    } //perubahan

    0 references
    public void PrintVideoDetails()
    {
        Console.WriteLine($"ID: {id}");
        Console.WriteLine($"Title: {title}");
        Console.WriteLine($"Play Count: {playCount}\n");
    }
}

3 references
class SayaTubeUser
{
    private int id;
    private List<SayaTubeVideo> uploadedVideos;
    2 references
    public string Username { get; private set; }

    1 reference
    public SayaTubeUser(string username)
    {
        if (username == null) throw new ArgumentNullException("Username tidak boleh null"); //perubahan
        if (username.Length > 100) throw new ArgumentException("Username tidak boleh lebih dari 100 karakter"); //perubahan

        Random random = new Random();
        this.id = random.Next(10000, 99999);
        this.Username = username;
        this.uploadedVideos = new List<SayaTubeVideo>();
    }

    2 references
    public void AddVideo(SayaTubeVideo video)
    {
        if (video == null) throw new ArgumentNullException("Video tidak boleh null"); //perubahan
        if (video.PlayCount >= int.MaxValue) throw new ArgumentException("Play count tidak boleh lebih dari batas maksimum integer"); //perubahan

        uploadedVideos.Add(video);
    }

    0 references
    public int GetTotalVideoPlayCount()
    {
        int total = 0;
        foreach (var video in uploadedVideos)
        {
            total += video.PlayCount;
        }
        return total;
    }

    1 reference
    public void PrintAllVideoPlaycount()
    {
        Console.WriteLine($"User: {Username}");
        int maxPrint = Math.Min(8, uploadedVideos.Count); //perubahan
        for (int i = 0; i < maxPrint; i++)
        {
            Console.WriteLine($"Video {i + 1} judul: {uploadedVideos[i].Title}");
        }
    }
}

```

```

class Program
{
    0 references
    static void Main()
    {
        try // perubahan
        {
            SayaTubeUser user = new SayaTubeUser("Alya Rabani");

            List<string> filmTitles = new List<string>
            {
                "Review Film Inception oleh Alya Rabani",
                "Review Film Interstellar oleh Alya Rabani",
                "Review Film Anora oleh Alya Rabani",
                "Review Film The Dark Knight oleh Alya Rabani",
                "Review Film Parasite oleh Alya Rabani",
                "Review Film The Godfather oleh Alya Rabani",
                "Review Film Fight Club oleh Alya Rabani",
                "Review Film Dirty Dancing oleh Alya Rabani",
                "Review Film A Brighter Summer Days oleh Alya Rabani",
                "Review Film The Substance oleh Alya Rabani"
            };

            foreach (var title in filmTitles)
            {
                SayaTubeVideo video = new SayaTubeVideo(title);
                user.AddVideo(video);
            }

            user.PrintAllVideoPlaycount();

            // Uji batas play count
            SayaTubeVideo testVideo = new SayaTubeVideo("Review Film Uji Maksimun");
            try
            {
                testVideo.IncreasePlayCount(25000001); // Harus error
            }
            catch (Exception e)
            {
                Console.WriteLine($"ERROR: {e.Message}");
            }

            try
            {
                testVideo.IncreasePlayCount(-5);
            }
            catch (Exception e)
            {
                Console.WriteLine($"ERROR: {e.Message}");
            }

            user.AddVideo(testVideo);
        }
        catch (Exception ex)
        {
            Console.WriteLine($"Terjadi kesalahan: {ex.Message}");
        }
    }
}

```

Output yang dihasilkan:

```

Microsoft Visual Studio Debu: X + | v
User: Alya Rabani
Video 1 judul: Review Film Inception oleh Alya Rabani
Video 2 judul: Review Film Interstellar oleh Alya Rabani
Video 3 judul: Review Film Anora oleh Alya Rabani
Video 4 judul: Review Film The Dark Knight oleh Alya Rabani
Video 5 judul: Review Film Parasite oleh Alya Rabani
Video 6 judul: Review Film The Godfather oleh Alya Rabani
Video 7 judul: Review Film Fight Club oleh Alya Rabani
Video 8 judul: Review Film Dirty Dancing oleh Alya Rabani
ERROR: Maksimum play count adalah 25.000.000
ERROR: Play count tidak boleh negatif
C:\Users\Lenovo\source\repos\KPL_ALYA_RABANI_2311104076_SE-07-02\06_Design_by_Contract_dan_Defensive_Programming\tjmodul
6_2311104076\tjmodul6_2311104076\bin\Debug\net8.0\tjmodul6_2311104076.exe (process 14692) exited with code 0 (0x0).
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .|

```

5. Melakukan commit terakhir

```
C:\Windows\system32\cmd.exe
** Visual Studio 2022 Developer Command Prompt v17.13.0
** Copyright (c) 2022 Microsoft Corporation
*****

C:\Users\Lenovo\source\repos\KPL_ALYA_RABANI_2311104076_SE-07-02\06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076>
git add .

C:\Users\Lenovo\source\repos\KPL_ALYA_RABANI_2311104076_SE-07-02\06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076>
git commit -m "penambahan design by contract pada semua kelas"
[main ac253b6] penambahan design by contract pada semua kelas
18 files changed, 85 insertions(+), 32 deletions(-)
 create mode 100644 06_Design_by_Contract_dan_Defensive_Programming/tjmodul6_2311104076/.vs/tjmodul6_2311104076/FileContentIndex/695e
a5db-9d33-49b4-a55a-775374a1f7c8.vsidx
 delete mode 100644 06_Design_by_Contract_dan_Defensive_Programming/tjmodul6_2311104076/.vs/tjmodul6_2311104076/FileContentIndex/7fc9
ed57-6919-4e5b-a105-292d4fd2f9ec.vsidx

C:\Users\Lenovo\source\repos\KPL_ALYA_RABANI_2311104076_SE-07-02\06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076>
git push origin main
Enumerating objects: 53, done.
Counting objects: 100% (53/53), done.
Delta compression using up to 12 threads
Compressing objects: 100% (26/26), done.
Writing objects: 100% (29/29), 12.21 KiB | 2.44 MiB/s, done.
Total 29 (delta 17), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (17/17), completed with 16 local objects.
To https://github.com/rabaniaalya/KPL_ALYA_RABANI_2311104076_SE-07-02.git
 730cb5c..ac253b6  main -> main

C:\Users\Lenovo\source\repos\KPL_ALYA_RABANI_2311104076_SE-07-02\06_Design_by_Contract_dan_Defensive_Programming\tjmodul6_2311104076>
```