ПМГ „Академик Боян Петканчин“ – Хасково

НП „Обучение за ИТ кариера“

Документация

Модул 7: Разработка на софтуер

Тема: Botanical Garden

Botanical Garden

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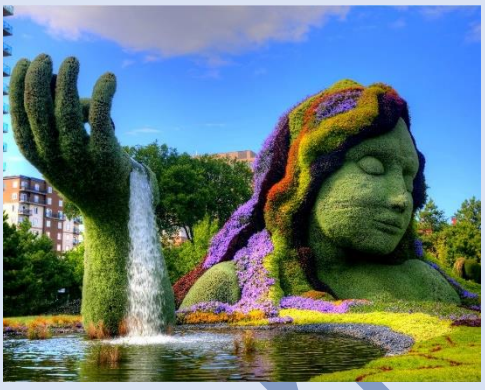
Въведение

★ Какво представлява програмата?



Програмата е предназначена за ботанически градини, в които се отглеждат, категоризират и документират цветя и растения. Тя поддържа пет вида растения: 🌷цветя, 🌳дървета, 🌿храсти, 🌵кактуси и 🌾треви. И категоризиране по сезон за всяко растение. За всяко едно растение в базата данни се съхранява информация.

★ Какви функционалности поддържа?

- Извеждане на списък с всички налични растения
- Добавяне на растение
- Актуализиране на данните за дадено растение
- Търсене на растение по име
- Изтриване на растение по ИД номер
- Търсене на растение по сезон

```
-------------------------------------
                FLOWER MENU
-------------------------------------
1. List all flowes
2. Add new flower
3. Update flower
4. Fetch flower by Name
5. Delete entry by Id
6. Search flower by season
7. Back
```

Botanical Garden

Линк към GitHub:

https://github.com/feray03/BotanicalGarden

Код

❖ Data

✓ Models

- Flower.cs

```
public int Id { get; set; }
public string Name { get; set; }
public string Color { get; set; }
public string LifeExpectancy { get; set; }
public int SeasonsId { get; set; }
public virtual Season Seasons { get; set; }
```

- Tree.cs

```
public int Id { get; set; }
public string Name { get; set; }
public string Type { get; set; }
public decimal Height { get; set; }
public decimal StemDiameter { get; set; }
public int SeasonsId { get; set; }
public virtual Season Seasons { get; set; }
```

- Shrub.cs

```
public int Id { get; set; }
public string Name { get; set; }
public string Type { get; set; }
public decimal Height { get; set; }
public string LifeExpectancy { get; set; }
public int SeasonsId { get; set; }
public virtual Season Seasons { get; set; }
```

- Cactus.cs

```
public int Id { get; set; }
public string Name { get; set; }
public decimal Height { get; set; }
public string Thorns { get; set; }
public int SeasonsId { get; set; }
public virtual Season Seasons { get; set; }
```

- Grass.cs

```
public int Id { get; set; }
public string Name { get; set; }
public decimal Height { get; set; }
public int SeasonsId { get; set; }
public virtual Season Seasons { get; set; }
```

- Season.cs

```
public int Id { get; set; }
public string Name { get; set; }
public virtual ICollection<Flower> Flowers { get; set; }
public virtual ICollection<Tree> Trees { get; set; }
public virtual ICollection<Shrub> Shrubs { get; set; }
public virtual ICollection<Cactus> Cactuses { get; set; }
public virtual ICollection<Grass> Grasses { get; set; }
```

✓Context

- GardenContext.cs

```
/// <summary>
/// Context to connect to the database.
/// </summary>

public class GardenContext : DbContext
{
    public virtual DbSet<Season> Seasons { get; set; }
    public virtual DbSet<Flower> Flowers { get; set; }
    public virtual DbSet<Tree> Trees { get; set; }
    public virtual DbSet<Shrub> Shrubs { get; set; }
    public virtual DbSet<Cactus> Cactuses { get; set; }
    public virtual DbSet<Grass> Grasses { get; set; }

    protected override void OnModelCreating(ModelBuilder modelBuilder)
    {
        modelBuilder.Entity<Season>()
            .HasMany(p => p.Flowers)
            .WithOne(b => b.Seasons)
            .HasForeignKey(b => b.SeasonsId);

        modelBuilder.Entity<Season>()
            .HasMany(p => p.Trees)
            .WithOne(b => b.Seasons)
            .HasForeignKey(b => b.SeasonsId);

        modelBuilder.Entity<Season>()
            .HasMany(p => p.Shrubs)
            .WithOne(b => b.Seasons)
            .HasForeignKey(b => b.SeasonsId);

        modelBuilder.Entity<Season>()
            .HasMany(p => p.Cactuses)
            .WithOne(b => b.Seasons)
            .HasForeignKey(b => b.SeasonsId);

        modelBuilder.Entity<Season>()
            .HasMany(p => p.Grasses)
            .WithOne(b => b.Seasons)
            .HasForeignKey(b => b.SeasonsId);
    }

    protected override void OnConfiguring(DbContextOptionsBuilder optionsBuilder)
    {
        optionsBuilder.UseSqlServer("Server = .\\SQLEXPRESS; Database = BotanicalGarden;
          Integrated Security = true ");
    }
}
```

❖Business

- FlowerBusiness.cs

```
    private GardenContext context;

    /// <summary>
    ///
    /// </summary>
    /// <param name="gardenContext"></param>
```

```
        public FlowerBusiness(GardenContext gardenContext)
        {
            context = gardenContext;
        }

        public FlowerBusiness()
        {
            context = new GardenContext();
        }

        /// <summary>
        /// Gives all flowers in the database.
        /// </summary>
        /// <returns>all flowers from the database</returns>
        public List<Flower> GetAllFlowers()
        {
            return context.Flowers.ToList();
        }

        /// <summary>
        /// Gives flower with wanted name.
        /// </summary>
        /// <param name="name">name of the wanted flower</param>
        /// <returns>flower with wanted name</returns>

        public Flower GetFlowerByName(string name)
        {
            return context.Flowers.SingleOrDefault(flower => flower.Name == name);
        }

        /// <summary>
        /// Adds flower in database.
        /// </summary>
        /// <param name="flower">the flower that will be added</param>
        public void Add(Flower flower)
        {
            context.Flowers.Add(flower);
            context.SaveChanges();
        }

        /// <summary>
        /// Updates flower.
        /// </summary>
        /// <param name="flower">the flower that will be updated</param>
        public void Update(Flower flower)
        {
            var item = context.Flowers.Find(flower.Id);
            if (item != null)
            {
                context.Entry(item).CurrentValues.SetValues(flower);
                context.SaveChanges();
            }
        }

        /// <summary>
        /// Deletes a flower with wanted id.
        /// </summary>
        /// <param name="id">id of the wanted flower</param>
        public void Delete(int id)
        {
            var item = context.Flowers.FirstOrDefault(m => m.Id == id);
            if (item != null)
            {
                context.Flowers.Remove(item);
                context.SaveChanges();
```

```
        }
    }

    public Season GetSeason(string name)
    {
        var Flower = this.GetFlowerByName(name);
        return context.Seasons.Find(Flower.SeasonsId);
    }

    /// <summary>
    /// Returns an array of flowers with the corresponding season.
    /// </summary>
    /// <param name="seasonId"></param>
    /// <returns></returns>
    public List<Flower> SearchBySeason(int seasonId)
    {
        Season FlowerSeason = context.Seasons.SingleOrDefault(season => season.Id == sea
      sonId);
        return context.Flowers.Where(flower => flower.SeasonsId == FlowerSeason.Id).ToLi
      st();
    }
```

- TreeBusiness.cs

```
    private GardenContext context;

    /// <summary>
    ///
    /// </summary>
    /// <param name="gardenContext"></param>
    public TreeBusiness(GardenContext gardenContext)
    {
        context = gardenContext;
    }

    public TreeBusiness()
    {
        context = new GardenContext();
    }

    /// <summary>
    /// Gives all trees in the database.
    /// </summary>
    /// <returns>all trees from the database</returns>
    public List<Tree> GetAllTrees()
    {
        return context.Trees.ToList();
    }

    /// <summary>
    /// Gives tree with wanted name.
    /// </summary>
    /// <param name="id">id of the wanted tree</param>
    /// <returns>tree with wanted id</returns>
    public Tree GetTreeByName(string name)
    {
        return context.Trees.SingleOrDefault(tree => tree.Name == name);
    }

    /// <summary>
    /// Adds tree in database.
    /// </summary>
```

```
        /// <param name="tree">the tree that will be added</param>
        public void Add(Tree tree)
        {
            context.Trees.Add(tree);
            context.SaveChanges();
        }

        /// <summary>
        /// Updates tree.
        /// </summary>
        /// <param name="tree">the tree that will be updated</param>
        public void Update(Tree tree)
        {
            var item = context.Trees.Find(tree.Id);
            if (item != null)
            {
                context.Entry(item).CurrentValues.SetValues(tree);
                context.SaveChanges();
            }
        }

        /// <summary>
        /// Deletes a tree with wanted id.
        /// </summary>
        /// <param name="id">id of the wanted tree</param>
        public void Delete(int id)
        {
            var item = context.Trees.FirstOrDefault(m => m.Id == id);
            if (item != null)
            {
                context.Trees.Remove(item);
                context.SaveChanges();
            }
        }

        public Season GetSeason(string name)
        {
            var Tree = this.GetTreeByName(name);
            return context.Seasons.Find(Tree.SeasonsId);
        }

        /// <summary>
        /// Returns an array of trees with the corresponding season.
        /// </summary>
        /// <param name="seasonId"></param>
        /// <returns></returns>
        public List<Tree> SearchBySeason(int seasonId)
        {
            Season TreeSeason = context.Seasons.SingleOrDefault(season => season.Id == seaso
          nId);
            return context.Trees.Where(tree => tree.SeasonsId == TreeSeason.Id).ToList();
        }
```

- ShrubBusiness.cs

```
private GardenContext context;

        /// <summary>
        ///
```

```
        /// </summary>
        /// <param name="gardenContext"></param>
        public ShrubBusiness(GardenContext gardenContext)
        {
            context = gardenContext;
        }

        public ShrubBusiness()
        {
            context = new GardenContext();
        }

        /// <summary>
        /// Gives shrub with wanted name.
        /// </summary>
        /// <param name="id">id of the wanted shrub</param>
        /// <returns>shrub with wanted id</returns>
        public Shrub GetShrubByName(string name)
        {
            return context.Shrubs.SingleOrDefault(shrub => shrub.Name == name);
        }

        /// <summary>
        /// Gives all shrubs in the database.
        /// </summary>
        /// <returns>all shrubs from the database</returns>
        public List<Shrub> GetAllShrubs()
        {
            return context.Shrubs.ToList();
        }

        /// <summary>
        /// Adds shrub in database.
        /// </summary>
        /// <param name="shrub">the shrub that will be added</param>
        public void Add(Shrub shrub)
        {
            context.Shrubs.Add(shrub);
            context.SaveChanges();
        }

        /// <summary>
        /// Updates shrub.
        /// </summary>
        /// <param name="shrub">the shrub that will be updated</param>
        public void Update(Shrub shrub)
        {
            var item = context.Shrubs.Find(shrub.Id);
            if (item != null)
            {
                context.Entry(item).CurrentValues.SetValues(shrub);
                context.SaveChanges();
            }
        }

        /// <summary>
        /// Deletes a shrub with wanted id.
        /// </summary>
        /// <param name="id">id of the wanted shrub</param>
        public void Delete(int id)
        {
            var item = context.Shrubs.FirstOrDefault(m => m.Id == id);
            if (item != null)
            {
                context.Shrubs.Remove(item);
```

```
            context.SaveChanges();
        }
    }

    public Season GetSeason(string name)
    {
        var Shrub = this.GetShrubByName(name);
        return context.Seasons.Find(Shrub.SeasonsId);
    }

    /// <summary>
    /// Returns an array of shrubs with the corresponding season.
    /// </summary>
    /// <param name="seasonId"></param>
    /// <returns></returns>
    public List<Shrub> SearchBySeason(int seasonId)
    {
        Season ShrubSeason = context.Seasons.SingleOrDefault(season => season.Id == seas
      onId);
        return context.Shrubs.Where(shrub => shrub.SeasonsId == ShrubSeason.Id).ToList()
      ;
    }
```

- CactusBusiness.cs

```
    private GardenContext context;

    /// <summary>
    ///
    /// </summary>
    /// <param name="gardenContext"></param>
    public CactusBusiness(GardenContext gardenContext)
    {
        context = gardenContext;
    }

    public CactusBusiness()
    {
        context = new GardenContext();
    }

    /// <summary>
    /// Gives cactus with wanted name.
    /// </summary>
    /// <param name="id">id of the wanted cactus</param>
    /// <returns>cactus with wanted id</returns>
    public Cactus GetCactusByName(string name)
    {
        return context.Cactuses.SingleOrDefault(cactus => cactus.Name == name);
    }

    /// <summary>
    /// Gives all cactuses in the database.
    /// </summary>
    /// <returns>all cactuses from the database</returns>
    public List<Cactus> GetAllCactuses()
    {
        return context.Cactuses.ToList();
    }

    /// <summary>
    /// Adds cactus in database.
```

```
        /// </summary>
        /// <param name="cactus">the cactus that will be added</param>
        public void Add(Cactus cactus)
        {
            context.Cactuses.Add(cactus);
            context.SaveChanges();
        }

        /// <summary>
        /// Updates cactus.
        /// </summary>
        /// <param name="cactus">the cactus that will be updated</param>
        public void Update(Cactus cactus)
        {
            var item = context.Cactuses.Find(cactus.Id);
            if (item != null)
            {
                context.Entry(item).CurrentValues.SetValues(cactus);
                context.SaveChanges();
            }
        }

        /// <summary>
        /// Deletes a cactus with wanted id.
        /// </summary>
        /// <param name="id">id of the wanted cactus</param>
        public void Delete(int id)
        {
            var item = context.Cactuses.FirstOrDefault(m => m.Id == id);
            if (item != null)
            {
                context.Cactuses.Remove(item);
                context.SaveChanges();
            }
        }

        public Season GetSeason(string name)
        {
            var Cactus = this.GetCactusByName(name);
            return context.Seasons.Find(Cactus.SeasonsId);
        }

        /// <summary>
        /// Returns an array of cactuses with the corresponding season.
        /// </summary>
        /// <param name="seasonId"></param>
        /// <returns></returns>
        public List<Cactus> SearchBySeason(int seasonId)
        {
            Season CactusSeason = context.Seasons.SingleOrDefault(season => season.Id == sea
          sonId);
            return context.Cactuses.Where(cactus => cactus.SeasonsId == CactusSeason.Id).ToL
          ist();
        }
```

- GrassBusiness.cs

```
        private GardenContext context;

        /// <summary>
        ///
        /// </summary>
```

```
        /// <param name="gardenContext"></param>
        public GrassBusiness(GardenContext gardenContext)
        {
            context = gardenContext;
        }

        public GrassBusiness()
        {
            context = new GardenContext();
        }

        /// <summary>
        /// Gives grass with wanted name.
        /// </summary>
        /// <param name="id">id of the wanted grass</param>
        /// <returns>grass with wanted id</returns>
        public Grass GetGrassByName(string name)
        {
            return context.Grasses.SingleOrDefault(grass => grass.Name == name);
        }

        /// <summary>
        /// Gives all Grasses in the database.
        /// </summary>
        /// <returns>all grases from the database</returns>
        public List<Grass> GetAllGrasses()
        {
            return context.Grasses.ToList();
        }

        /// <summary>
        /// Adds Grass in database.
        /// </summary>
        /// <param name="grass">the grass that will be added</param>
        public void Add(Grass grass)
        {
            context.Grasses.Add(grass);
            context.SaveChanges();
        }

        /// <summary>
        /// Updates Grass.
        /// </summary>
        /// <param name="grass">the grass that will be updated</param>
        public void Update(Grass grass)
        {
            var item = context.Grasses.Find(grass.Id);
            if (item != null)
            {
                context.Entry(item).CurrentValues.SetValues(grass);
                context.SaveChanges();
            }
        }

        /// <summary>
        /// Deletes a grass with wanted id.
        /// </summary>
        /// <param name="id">id of the wanted grass</param>
        public void Delete(int id)
        {
            var item = context.Grasses.FirstOrDefault(m => m.Id == id);
            if (item != null)
            {
                context.Grasses.Remove(item);
                context.SaveChanges();
```

```
        }
    }

    public Season GetSeason(string name)
    {
        var Grass = this.GetGrassByName(name);
        return context.Seasons.Find(Grass.SeasonsId);
    }

    /// <summary>
    /// Returns an array of grasses with the corresponding season.
    /// </summary>
    /// <param name="seasonId"></param>
    /// <returns></returns>
    public List<Grass> SearchBySeason(int seasonId)
    {
        Season GrassSeason = context.Seasons.SingleOrDefault(season => season.Id == seas
      onId);
        return context.Grasses.Where(grass => grass.SeasonsId == GrassSeason.Id).ToList(
      );
    }
```

- Presentation
  - FlowerDisplay.cs

```
    private int closeOperationId = 7;
    private FlowerBusiness flowerBusiness;

    private void ShowMenu()
    {
        Console.WriteLine(new string('-', 40));
        Console.WriteLine(new string(' ', 18) + "FLOWER MENU" + new string(' ', 11));
        Console.WriteLine(new string('-', 40));
        Console.WriteLine("1. List all flowes");
        Console.WriteLine("2. Add new flower");
        Console.WriteLine("3. Update flower");
        Console.WriteLine("4. Fetch flower by Name");
        Console.WriteLine("5. Delete entry by Id");
        Console.WriteLine("6. Search flower by season");
        Console.WriteLine("7. Back");
    }

    private void Input()
    {
        var operation = -1;
        do
        {
            ShowMenu();
            operation = int.Parse(Console.ReadLine());
            switch (operation)
            {
                case 1:
                    ListAllFlowers();
                    break;
                case 2:
                    Add();
                    break;
                case 3:
```

```
                    Update();
                    break;
                case 4:
                    Fetch();
                    break;
                case 5:
                    Delete();
                    break;
                case 6:
                    SearchFlowerBySeason();
                    break;
                default:
                    break;
            }
        }
        while (operation != closeOperationId);
    }

    public FlowerDisplay()
    {
        flowerBusiness = new FlowerBusiness();
        Input();
    }

    private void ListAllFlowers()
    {
        Console.WriteLine(new string('-', 40));
        Console.WriteLine(new string(' ', 16) + "Flowers" + new string(' ', 16));
        Console.WriteLine(new string('-', 40));
        var flowers = flowerBusiness.GetAllFlowers();
        foreach (var flower in flowers)
        {
            var Seasons = flowerBusiness.GetSeason(flower.Name);
            Console.WriteLine($"{flower.Id} - {flower.Name}, {flower.Color}, {flower.Lif
  eExpectancy}, {Seasons.Name}");
        }
        Console.WriteLine(new string('-', 40));
    }

    private void Add()
    {
        Flower flower = new Flower();
        Console.WriteLine("Enter name: ");
        flower.Name = Console.ReadLine();
        Console.WriteLine("Enter color: ");
        flower.Color = Console.ReadLine();
        Console.WriteLine("Enter life expectancy: ");
        flower.LifeExpectancy = Console.ReadLine();
        Console.WriteLine("Enter seasons Id: ");
        flower.SeasonsId = int.Parse(Console.ReadLine());
        flowerBusiness.Add(flower);
        Console.WriteLine("The flower was successfully added!");
    }

    private void Update()
    {
        Console.WriteLine("Enter Name to update: ");
        string name = Console.ReadLine();
        Flower flower = flowerBusiness.GetFlowerByName(name);
        if (flower != null)
        {
            Console.WriteLine("Enter name: ");
            flower.Name = Console.ReadLine();
            Console.WriteLine("Enter color: ");
            flower.Color = Console.ReadLine();
```

```
            Console.WriteLine("Enter life expectancy: ");
            flower.LifeExpectancy = Console.ReadLine();
            Console.WriteLine("Enter seasons Id: ");
            flower.SeasonsId = int.Parse(Console.ReadLine());
            flowerBusiness.Update(flower);
            Console.WriteLine("The flower was updated successfully!");
        }
        else
        {
            Console.WriteLine("Flower not found!");
        }
    }

    private void Fetch()
    {
        Console.WriteLine("Enter Name to fetch: ");
        string name = Console.ReadLine();
        var flower = flowerBusiness.GetFlowerByName(name);
        if (flower != null)
        {
            var FlowerSeason = flowerBusiness.GetSeason(flower.Name);
            Console.WriteLine(new string('-', 40));
            Console.WriteLine("ID: " + flower.Id);
            Console.WriteLine("Name: " + flower.Name);
            Console.WriteLine("Color: " + flower.Color);
            Console.WriteLine("Life Expectancy: " + flower.LifeExpectancy);
            Console.WriteLine("Seasons: " + FlowerSeason.Name);
            Console.WriteLine(new string('-', 40));
        }
        else
        {
            Console.WriteLine("Flower not found!");
        }
    }

    private void Delete()
    {
        Console.WriteLine("Enter Id to delete: ");
        int id = int.Parse(Console.ReadLine());
        flowerBusiness.Delete(id);
        Console.WriteLine("Done.");
    }

    private void SearchFlowerBySeason()
    {
        Console.WriteLine("Enter season id: ");
        Console.WriteLine("(1-spring, 2-summer, 3-autumn, 4-winter)");
        int seasonId = int.Parse(Console.ReadLine());
        List<Flower> flowers = flowerBusiness.SearchBySeason(seasonId);
        Console.WriteLine(new string('-', 40));
        Console.WriteLine(new string(' ', 16) + "Flowers" + new string(' ', 16));
        Console.WriteLine(new string('-', 40));
        foreach (var flower in flowers)
        {
            Console.WriteLine($"{flower.Id} - {flower.Name}");
        }
    }
```

- TreeDisplay.cs

```
        private int closeOperationId = 7;
        private TreeBusiness treeBusiness;

        private void ShowMenu()
        {
            Console.WriteLine(new string('-', 40));
            Console.WriteLine(new string(' ', 18) + "TREE MENU" + new string(' ', 18));
            Console.WriteLine(new string('-', 40));
            Console.WriteLine("1. List all trees");
            Console.WriteLine("2. Add new tree");
            Console.WriteLine("3. Update tree");
            Console.WriteLine("4. Fetch tree by Name");
            Console.WriteLine("5. Delete entry by Id");
            Console.WriteLine("6. Search tree by season");
            Console.WriteLine("7. Back");
        }

        private void Input()
        {
            var operation = -1;
            do
            {
                ShowMenu();
                operation = int.Parse(Console.ReadLine());


                switch (operation)
                {
                    case 1:
                        ListAllTrees();
                        break;
                    case 2:
                        Add();
                        break;
                    case 3:
                        Update();
                        break;
                    case 4:
                        Fetch();
                        break;
                    case 5:
                        Delete();
                        break;
                    case 6:
                        SearchTreeBySeason();
                        break;
                    default:
                        break;
                }
            }
            while (operation != closeOperationId);
        }

        public TreeDisplay()
        {
            treeBusiness = new TreeBusiness();
            Input();
        }

        private void ListAllTrees()
        {
            Console.WriteLine(new string('-', 40));
```

```
            Console.WriteLine(new string(' ', 16) + "Trees" + new string(' ', 16));
            Console.WriteLine(new string('-', 40));
            var trees = treeBusiness.GetAllTrees();
            foreach (var tree in trees)
            {
                var Seasons = treeBusiness.GetSeason(tree.Name);
                Console.WriteLine($"{tree.Id} - {tree.Name}, {tree.Type}, {tree.Height}, {tr
      ee.StemDiameter}, {Seasons.Name}");
            }
            Console.WriteLine(new string('-', 40));
        }

        private void Add()
        {
            Tree tree = new Tree();
            Console.WriteLine("Enter name: ");
            tree.Name = Console.ReadLine();
            Console.WriteLine("Enter type: ");
            tree.Type = Console.ReadLine();
            Console.WriteLine("Enter height: ");
            tree.Height = decimal.Parse(Console.ReadLine());
            Console.WriteLine("Enter stem diameter: ");
            tree.StemDiameter = decimal.Parse(Console.ReadLine());
            Console.WriteLine("Enter seasons Id: ");
            tree.SeasonsId = int.Parse(Console.ReadLine());
            treeBusiness.Add(tree);
            Console.WriteLine("The tree was successfully added!");
        }

        private void Update()
        {
            Console.WriteLine("Enter Name to update: ");
            string name = Console.ReadLine();
            Tree tree = treeBusiness.GetTreeByName(name);
            if (tree != null)
            {
                Console.WriteLine("Enter name: ");
                tree.Name = Console.ReadLine();
                Console.WriteLine("Enter type: ");
                tree.Type = Console.ReadLine();
                Console.WriteLine("Enter height: ");
                tree.Height = decimal.Parse(Console.ReadLine());
                Console.WriteLine("Enter stem diameter: ");
                tree.StemDiameter = decimal.Parse(Console.ReadLine());
                Console.WriteLine("Enter seasons Id: ");
                tree.SeasonsId = int.Parse(Console.ReadLine());
                treeBusiness.Update(tree);
                Console.WriteLine("The tree was updated successfully!");
            }
            else
            {
                Console.WriteLine("Tree not found!");
            }
        }

        private void Fetch()
        {
            Console.WriteLine("Enter Name to fetch: ");
            string name = Console.ReadLine();
            var tree = treeBusiness.GetTreeByName(name);
            if (tree != null)
            {
                var TreeSeason = treeBusiness.GetSeason(tree.Name);
                Console.WriteLine(new string('-', 40));
                Console.WriteLine("ID: " + tree.Id);
```

```
            Console.WriteLine("Name: " + tree.Name);
            Console.WriteLine("Type: " + tree.Type);
            Console.WriteLine("Height: " + tree.Height);
            Console.WriteLine("Stem Diameter: " + tree.StemDiameter);
            Console.WriteLine("Seasons: " + TreeSeason.Name);
            Console.WriteLine(new string('-', 40));
        }
        else
        {
            Console.WriteLine("Tree not found!");
        }
    }

    private void Delete()
    {
        Console.WriteLine("Enter Id to delete: ");
        int id = int.Parse(Console.ReadLine());
        treeBusiness.Delete(id);
        Console.WriteLine("Done.");
    }
    private void SearchTreeBySeason()
    {
        Console.WriteLine("Enter season id: ");
        Console.WriteLine("(1-spring, 2-summer, 3-autumn, 4-winter)");
        int seasonId = int.Parse(Console.ReadLine());
        List<Tree> trees = treeBusiness.SearchBySeason(seasonId);
        Console.WriteLine(new string('-', 40));
        Console.WriteLine(new string(' ', 16) + "Trees" + new string(' ', 16));
        Console.WriteLine(new string('-', 40));
        foreach (var tree in trees)
        {
            Console.WriteLine($"{tree.Id} - {tree.Name}");
        }
    }
```

- ShrubDisplay.cs

```
    private int closeOperationId = 7;
    private ShrubBusiness shrubBusiness;

    private void ShowMenu()
    {
        Console.WriteLine(new string('-', 40));
        Console.WriteLine(new string(' ', 18) + "SHRUB MENU" + new string(' ', 18));
        Console.WriteLine(new string('-', 40));
        Console.WriteLine("1. List all shrubs");
        Console.WriteLine("2. Add new shrub");
        Console.WriteLine("3. Update shrub");
        Console.WriteLine("4. Fetch shrub by Name");
        Console.WriteLine("5. Delete entry by Id");
        Console.WriteLine("6. Search shrub by season");
        Console.WriteLine("7. Back");
    }

    private void Input()
    {
        var operation = -1;
        do
        {
            ShowMenu();
            operation = int.Parse(Console.ReadLine());
            switch (operation)
```

```
            {
                case 1:
                    ListAllShrubs();
                    break;
                case 2:
                    Add();
                    break;
                case 3:
                    Update();
                    break;
                case 4:
                    Fetch();
                    break;
                case 5:
                    Delete();
                    break;
                case 6:
                    SearchShrubBySeason();
                    break;
                default:
                    break;
            }
        }
        while (operation != closeOperationId);
    }

    public ShrubDisplay()
    {
        shrubBusiness = new ShrubBusiness();
        Input();
    }

    private void ListAllShrubs()
    {
        Console.WriteLine(new string('-', 40));
        Console.WriteLine(new string(' ', 16) + "Shrubs" + new string(' ', 16));
        Console.WriteLine(new string('-', 40));
        var shrubs = shrubBusiness.GetAllShrubs();
        foreach (var shrub in shrubs)
        {
            var Seasons = shrubBusiness.GetSeason(shrub.Name);
            Console.WriteLine($"{shrub.Id} - {shrub.Name}, {shrub.Type}, {shrub.Height},
       {shrub.LifeExpectancy}, {Seasons.Name}");
        }
        Console.WriteLine(new string('-', 40));
    }

    private void Add()
    {
        Shrub shrub = new Shrub();
        Console.WriteLine("Enter name: ");
        shrub.Name = Console.ReadLine();
        Console.WriteLine("Enter type: ");
        shrub.Type = Console.ReadLine();
        Console.WriteLine("Enter height: ");
        shrub.Height = decimal.Parse(Console.ReadLine());
        Console.WriteLine("Enter life expectancy: ");
        shrub.LifeExpectancy = Console.ReadLine();
        Console.WriteLine("Enter seasons Id: ");
        shrub.SeasonsId = int.Parse(Console.ReadLine());
        shrubBusiness.Add(shrub);
        Console.WriteLine("The shrub was successfully added!");
    }

    private void Update()
```

```
        {
            Console.WriteLine("Enter Name to update: ");
            string name = Console.ReadLine();
            Shrub shrub = shrubBusiness.GetShrubByName(name);
            if (shrub != null)
            {
                Console.WriteLine("Enter name: ");
                shrub.Name = Console.ReadLine();
                Console.WriteLine("Enter type: ");
                shrub.Type = Console.ReadLine();
                Console.WriteLine("Enter height: ");
                shrub.Height = decimal.Parse(Console.ReadLine());
                Console.WriteLine("Enter life expectancy: ");
                shrub.LifeExpectancy = Console.ReadLine();
                Console.WriteLine("Enter seasons Id: ");
                shrub.SeasonsId = int.Parse(Console.ReadLine());
                shrubBusiness.Update(shrub);
                Console.WriteLine("The shrub was updated successfully!");
            }
            else
            {
                Console.WriteLine("Shrub not found!");
            }
        }

        private void Fetch()
        {
            Console.WriteLine("Enter Name to fetch: ");
            string name = Console.ReadLine();
            var shrub = shrubBusiness.GetShrubByName(name);
            if (shrub != null)
            {
                var ShrubSeason = shrubBusiness.GetSeason(shrub.Name);
                Console.WriteLine(new string('-', 40));
                Console.WriteLine("ID: " + shrub.Id);
                Console.WriteLine("Name: " + shrub.Name);
                Console.WriteLine("Type: " + shrub.Type);
                Console.WriteLine("Height: " + shrub.Height);
                Console.WriteLine("Life Expectancy: " + shrub.LifeExpectancy);
                Console.WriteLine("Seasons: " + ShrubSeason.Name);
                Console.WriteLine(new string('-', 40));
            }
            else
            {
                Console.WriteLine("Shrub not found!");
            }
        }

        private void Delete()
        {
            Console.WriteLine("Enter Id to delete: ");
            int id = int.Parse(Console.ReadLine());
            shrubBusiness.Delete(id);
            Console.WriteLine("Done.");
        }

        private void SearchShrubBySeason()
        {
            Console.WriteLine("Enter season id: ");
            Console.WriteLine("(1-spring, 2-summer, 3-autumn, 4-winter)");
            int seasonId = int.Parse(Console.ReadLine());
            List<Shrub> shrubs = shrubBusiness.SearchBySeason(seasonId);
            Console.WriteLine(new string('-', 40));
            Console.WriteLine(new string(' ', 16) + "Shrubs" + new string(' ', 16));
            Console.WriteLine(new string('-', 40));
```

```
            foreach (var shrub in shrubs)
            {
                Console.WriteLine($"{shrub.Id} - {shrub.Name}");
            }
        }
```

- CactusDisplay.cs

```
private int closeOperationId = 7;
        private CactusBusiness cactusBusiness;

        private void ShowMenu()
        {
            Console.WriteLine(new string('-', 40));
            Console.WriteLine(new string(' ', 18) + "CACTUS MENU" + new string(' ', 18));
            Console.WriteLine(new string('-', 40));
            Console.WriteLine("1. List all cactus");
            Console.WriteLine("2. Add new cactus");
            Console.WriteLine("3. Update cactus");
            Console.WriteLine("4. Fetch cactus by Name");
            Console.WriteLine("5. Delete entry by Id");
            Console.WriteLine("6. Search cactus by season");
            Console.WriteLine("7. Back");
        }

        private void Input()
        {
            var operation = -1;
            do
            {
                ShowMenu();
                operation = int.Parse(Console.ReadLine());
                switch (operation)
                {
                    case 1:
                        ListAllCactuses();
                        break;
                    case 2:
                        Add();
                        break;
                    case 3:
                        Update();
                        break;
                    case 4:
                        Fetch();
                        break;
                    case 5:
                        Delete();
                        break;
                    case 6:
                        SearchCactusBySeason();
                        break;
                    default:
                        break;
                }
            }
            while (operation != closeOperationId);
        }

        public CactusDisplay()
        {
            cactusBusiness = new CactusBusiness();
```

```
            Input();
        }

        private void ListAllCactuses()
        {
            Console.WriteLine(new string('-', 40));
            Console.WriteLine(new string(' ', 16) + "Cactus" + new string(' ', 16));
            Console.WriteLine(new string('-', 40));
            var cactuses = cactusBusiness.GetAllCactuses();
            foreach (var cactus in cactuses)
            {
                var Seasons = cactusBusiness.GetSeason(cactus.Name);
                Console.WriteLine($"{cactus.Id} - {cactus.Name}, {cactus.Height}, {cactus.Th
          orns}, {Seasons.Name}");
            }
            Console.WriteLine(new string('-', 40));
        }

        private void Add()
        {
            Cactus cactus = new Cactus();
            Console.WriteLine("Enter name: ");
            cactus.Name = Console.ReadLine();
            Console.WriteLine("Enter height: ");
            cactus.Height = decimal.Parse(Console.ReadLine());
            Console.WriteLine("Enter thorns: ");
            cactus.Thorns = Console.ReadLine();
            Console.WriteLine("Enter seasons Id: ");
            cactus.SeasonsId = int.Parse(Console.ReadLine());
            cactusBusiness.Add(cactus);
            Console.WriteLine("The cactus was successfully added!");
        }

        private void Update()
        {
            Console.WriteLine("Enter Name to update: ");
            string name = Console.ReadLine();
            Cactus cactus = cactusBusiness.GetCactusByName(name);
            if (cactus != null)
            {
                Console.WriteLine("Enter name: ");
                cactus.Name = Console.ReadLine();
                Console.WriteLine("Enter height: ");
                cactus.Height = decimal.Parse(Console.ReadLine());
                Console.WriteLine("Enter thorns: ");
                cactus.Thorns = Console.ReadLine();
                Console.WriteLine("Enter seasons Id: ");
                cactus.SeasonsId = int.Parse(Console.ReadLine());
                cactusBusiness.Update(cactus);
                Console.WriteLine("The cactus was updated successfully!");
            }
            else
            {
                Console.WriteLine("Cactus not found!");
            }
        }

        private void Fetch()
        {
            Console.WriteLine("Enter Name to fetch: ");
            string name = Console.ReadLine();
            var cactus = cactusBusiness.GetCactusByName(name);
            if (cactus != null)
            {
                var CactusSeason = cactusBusiness.GetSeason(cactus.Name);
```

```
            Console.WriteLine(new string('-', 40));
            Console.WriteLine("ID: " + cactus.Id);
            Console.WriteLine("Name: " + cactus.Name);
            Console.WriteLine("Height: " + cactus.Height);
            Console.WriteLine("Thorns: " + cactus.Thorns);
            Console.WriteLine("Seasons: " + CactusSeason.Name);
            Console.WriteLine(new string('-', 40));
        }
        else
        {
            Console.WriteLine("Cactus not found!");
        }
    }

    private void Delete()
    {
        Console.WriteLine("Enter Id to delete: ");
        int id = int.Parse(Console.ReadLine());
        cactusBusiness.Delete(id);
        Console.WriteLine("Done.");
    }

    private void SearchCactusBySeason()
    {
        Console.WriteLine("Enter season id: ");
        Console.WriteLine("(1-spring, 2-summer, 3-autumn, 4-winter)");
        int seasonId = int.Parse(Console.ReadLine());
        List<Cactus> cactuses = cactusBusiness.SearchBySeason(seasonId);
        Console.WriteLine(new string('-', 40));
        Console.WriteLine(new string(' ', 16) + "Cactuses" + new string(' ', 16));
        Console.WriteLine(new string('-', 40));
        foreach (var cactus in cactuses)
        {
            Console.WriteLine($"{cactus.Id} - {cactus.Name}");
        }
    }
```

- GrassDisplay.cs

```
    private int closeOperationId = 7;
    private GrassBusiness grassBusiness;

    private void ShowMenu()
    {
        Console.WriteLine(new string('-', 40));
        Console.WriteLine(new string(' ', 18) + "GRASS MENU" + new string(' ', 18));
        Console.WriteLine(new string('-', 40));
        Console.WriteLine("1. List all grass");
        Console.WriteLine("2. Add new grass");
        Console.WriteLine("3. Update grass");
        Console.WriteLine("4. Fetch grass by Name");
        Console.WriteLine("5. Delete entry by Id");
        Console.WriteLine("6. Search grass by season");
        Console.WriteLine("7. Back");
    }
    private void Input()
    {
        var operation = -1;
        do
        {
            ShowMenu();
            operation = int.Parse(Console.ReadLine());
```

```
            switch (operation)
            {
                case 1:
                    ListAllGrasses();
                    break;
                case 2:
                    Add();
                    break;
                case 3:
                    Update();
                    break;
                case 4:
                    Fetch();
                    break;
                case 5:
                    Delete();
                    break;
                case 6:
                    SearchGrassBySeason();
                    break;
                default:
                    break;
            }
        }
        while (operation != closeOperationId);
    }

    public GrassDisplay()
    {
        grassBusiness = new GrassBusiness();
        Input();
    }

    private void ListAllGrasses()
    {
        Console.WriteLine(new string('-', 40));
        Console.WriteLine(new string(' ', 16) + "Grasses" + new string(' ', 16));
        Console.WriteLine(new string('-', 40));
        var grasses = grassBusiness.GetAllGrasses();
        foreach (var grass in grasses)
        {
            var Seasons = grassBusiness.GetSeason(grass.Name);
            Console.WriteLine($"{grass.Id } - {grass.Name}, {grass.Height}, {Seasons.Nam
  e}");
        }
        Console.WriteLine(new string('-', 40));
    }

    private void Add()
    {
        Grass grass = new Grass();
        Console.WriteLine("Enter name: ");
        grass.Name = Console.ReadLine();
        Console.WriteLine("Enter height: ");
        grass.Height = decimal.Parse(Console.ReadLine());
        Console.WriteLine("Enter seasons Id: ");
        grass.SeasonsId = int.Parse(Console.ReadLine());
        grassBusiness.Add(grass);
        Console.WriteLine("The grass was successfully added!");
    }


    private void Update()
    {
        Console.WriteLine("Enter Name to update: ");
```

```
            string name = Console.ReadLine();
            Grass grass = grassBusiness.GetGrassByName(name);
            if (grass != null)
            {
                Console.WriteLine("Enter name: ");
                grass.Name = Console.ReadLine();
                Console.WriteLine("Enter height: ");
                grass.Height = decimal.Parse(Console.ReadLine());
                Console.WriteLine("Enter seasons Id: ");
                grass.SeasonsId = int.Parse(Console.ReadLine());
                grassBusiness.Update(grass);
                Console.WriteLine("The grass was updated successfully!");
            }
            else
            {
                Console.WriteLine("Grass not found!");
            }
        }

        private void Fetch()
        {
            Console.WriteLine("Enter Name to fetch: ");
            string name = Console.ReadLine();
            var grass = grassBusiness.GetGrassByName(name);
            if (grass != null)
            {
                var GrassSeason = grassBusiness.GetSeason(grass.Name);
                Console.WriteLine(new string('-', 40));
                Console.WriteLine("ID: " + grass.Id);
                Console.WriteLine("Name: " + grass.Name);
                Console.WriteLine("Height: " + grass.Height);
                Console.WriteLine("Seasons: " + GrassSeason.Name);
                Console.WriteLine(new string('-', 40));
            }
            else
            {
                Console.WriteLine("Grass not found!");
            }
        }

        private void Delete()
        {
            Console.WriteLine("Enter Id to delete: ");
            int id = int.Parse(Console.ReadLine());
            grassBusiness.Delete(id);
            Console.WriteLine("Done.");
        }

        private void SearchGrassBySeason()
        {
            Console.WriteLine("Enter season id: ");
            Console.WriteLine("(1-spring, 2-summer, 3-autumn, 4-winter)");
            int seasonId = int.Parse(Console.ReadLine());
            List<Grass> grasses = grassBusiness.SearchBySeason(seasonId);
            Console.WriteLine(new string('-', 40));
            Console.WriteLine(new string(' ', 16) + "Grasses" + new string(' ', 16));
            Console.WriteLine(new string('-', 40));
            foreach (var grass in grasses)
            {
                Console.WriteLine($"{grass.Id} - {grass.Name}");
            }
        }
```

- Display.cs

```
        private int closeOperationId = 6;
        private void ShowMenu()
        {
            Console.WriteLine(new string('-', 40));
            Console.WriteLine(new string(' ', 18) + "MAIN MENU" + new string(' ', 18));
            Console.WriteLine(new string('-', 40));
            Console.WriteLine("1. Flower Menu");
            Console.WriteLine("2. Tree Menu");
            Console.WriteLine("3. Shrub Menu");
            Console.WriteLine("4. Cactus Menu");
            Console.WriteLine("5. Grass Menu");
            Console.WriteLine("6. Exit");
        }
        private void Input()
        {
            var operation = -1;
            do
            {
                ShowMenu();
                operation = int.Parse(Console.ReadLine());
                switch (operation)
                {
                    case 1:
                        CreateFlowerDisplay();
                        break;
                    case 2:
                        CreateTreeDisplay();
                        break;
                    case 3:
                        CreateShrubDisplay();
                        break;
                    case 4:
                        CreateCactusDisplay();
                        break;
                    case 5:
                        CreateGrassDisplay();
                        break;
                    default:
                        break;
                }
            } while (operation != closeOperationId);
        }
        public Display()
        {
            Input();
        }
        private void CreateFlowerDisplay()
        {
            FlowerDisplay display = new FlowerDisplay();
        }
        private void CreateTreeDisplay()
        {
            TreeDisplay display = new TreeDisplay();
        }

        private void CreateShrubDisplay()
        {
            ShrubDisplay display = new ShrubDisplay();
        }

        private void CreateCactusDisplay()
        {
```

```
            CactusDisplay display = new CactusDisplay();
        }

        private void CreateGrassDisplay()
        {
            GrassDisplay display = new GrassDisplay();
        }
```

❖Program.cs

```
static void Main(string[] args)
        {
            Information();
            Display display = new Display();
        }

        static void Information()
        {
            Console.WriteLine(new string('-', 42));
            Console.WriteLine(new string(' ', 5) + "NP\"Obuchenie IT kariera\"-
 2021" + new string(' ', 5));
            Console.WriteLine();
            Console.WriteLine(new string(' ', 10) + "Botanical Garden" + new string(' ', 10)
);
            Console.WriteLine(new string(' ', 5) + "Created by Monika and Feray" + new strin
g(' ', 5));
            Console.WriteLine(new string('-', 42));
            Console.WriteLine("Press a random key...");
            Console.ReadKey();
            Console.Clear();
        }
```

Тестове

- **FlowerTests.cs**

```
[TestCase]
        public void Gives_All_Flowers()
        {
            var data = new List<Flower>
            {
                new Flower { Name="First" },
                new Flower { Name="Second" },
                new Flower { Name="Third" },
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Flower>>();
            mockSet.As<IQueryable<Flower>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Flower>>().Setup(m => m.Expression).Returns(data.Expressio
      n);
            mockSet.As<IQueryable<Flower>>().Setup(m => m.ElementType).Returns(data.ElementT
      ype);
            mockSet.As<IQueryable<Flower>>().Setup(m => m.GetEnumerator()).Returns(data.GetE
      numerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(c => c.Flowers).Returns(mockSet.Object);

            var business = new FlowerBusiness(mockContext.Object);
            var Flowers = business.GetAllFlowers();
```

```
            Assert.AreEqual(3, Flowers.Count);
            Assert.AreEqual("First", Flowers[0].Name);
            Assert.AreEqual("Second", Flowers[1].Name);
            Assert.AreEqual("Third", Flowers[2].Name);
        }

        [TestCase]
        public void Add_Flower()
        {
            var mockSet = new Mock<DbSet<Flower>>();
            var flower = new Flower();
            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(m => m.Flowers).Returns(mockSet.Object);

            var business = new FlowerBusiness(mockContext.Object);
            business.Add(flower);

            mockSet.Verify(m => m.Add(It.IsAny<Flower>()), Times.Once());
            mockContext.Verify(m => m.SaveChanges(), Times.Once());
        }

        [TestCase]
        public void Gives_Flower_By_Name()
        {
            var data = new List<Flower>()
            {
                new Flower{Id=1, Name="Flower1"},
                new Flower{Id=2, Name="Flower2" },
                new Flower{Id=3, Name="Flower3"},
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Flower>>();
            mockSet.As<IQueryable<Flower>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Flower>>().Setup(m => m.Expression).Returns(data.Expressio
n);
            mockSet.As<IQueryable<Flower>>().Setup(m => m.ElementType).Returns(data.ElementT
ype);
            mockSet.As<IQueryable<Flower>>().Setup(m => m.GetEnumerator()).Returns(data.GetE
numerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(c => c.Flowers).Returns(mockSet.Object);

            var business = new FlowerBusiness(mockContext.Object);

            var flower = business.GetFlowerByName("Flower1");
            Assert.AreEqual("Flower1", flower.Name);
        }

        [TestCase]
        public void Update_Flower()
        {
            var mockContext = new Mock<GardenContext>(); ;
            var flowerBusiness=new FlowerBusiness();
            var Flower = new Flower() { Name = "Flower1" };
            try { flowerBusiness.Update(Flower); }
            catch { mockContext.Verify(m => m.Entry(It.IsAny<Flower>()), Times.Once()); }
        }

        [TestCase]
        public void Remove_Flower()
        {
            var data = new List<Flower>()
            {
                new Flower{Id=1, Name="Flower1"},
```

```
                new Flower{Id=2, Name="Flower2" },
                new Flower{Id=3, Name="Flower3"},
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Flower>>();
            mockSet.As<IQueryable<Flower>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Flower>>().Setup(m => m.Expression).Returns(data.Expressio
      n);
            mockSet.As<IQueryable<Flower>>().Setup(m => m.ElementType).Returns(data.ElementT
      ype);
            mockSet.As<IQueryable<Flower>>().Setup(m => m.GetEnumerator()).Returns(data.GetE
      numerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(x => x.Flowers).Returns(mockSet.Object);

            var business = new FlowerBusiness(mockContext.Object);
            var flowers = business.GetAllFlowers();

            int deletedFlowerId = 1; business.Delete(flowers[0].Id);

            Assert.IsNull(business.GetAllFlowers().FirstOrDefault(x => x.Id == deletedFlower
      Id));
        }
```

- TreeTests.cs

```
[TestCase]
        public void Gives_All_Flowers()
        {
            var data = new List<Tree>
            {
                new Tree { Name="First" },
                new Tree { Name="Second" },
                new Tree { Name="Third" },
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Tree>>();
            mockSet.As<IQueryable<Tree>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Tree>>().Setup(m => m.Expression).Returns(data.Expression)
      ;
            mockSet.As<IQueryable<Tree>>().Setup(m => m.ElementType).Returns(data.ElementTyp
      e);
            mockSet.As<IQueryable<Tree>>().Setup(m => m.GetEnumerator()).Returns(data.GetEnu
      merator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(c => c.Trees).Returns(mockSet.Object);

            var business = new TreeBusiness(mockContext.Object);
            var Trees = business.GetAllTrees();

            Assert.AreEqual(3, Trees.Count);
            Assert.AreEqual("First", Trees[0].Name);
            Assert.AreEqual("Second", Trees[1].Name);
            Assert.AreEqual("Third", Trees[2].Name);
```

```
    }

    [TestCase]
    public void Add_Tree()
    {
        var mockSet = new Mock<DbSet<Tree>>();
        var tree = new Tree();
        var mockContext = new Mock<GardenContext>();
        mockContext.Setup(m => m.Trees).Returns(mockSet.Object);

        var business = new TreeBusiness(mockContext.Object);
        business.Add(tree);

        mockSet.Verify(m => m.Add(It.IsAny<Tree>()), Times.Once());
        mockContext.Verify(m => m.SaveChanges(), Times.Once());
    }

    [TestCase]
    public void Gives_Tree_By_Name()
    {
        var data = new List<Tree>()
        {
            new Tree{Id=1, Name="Tree1"},
            new Tree{Id=2, Name="Tree2" },
            new Tree{Id=3, Name="Tree3"},
        }.AsQueryable();

        var mockSet = new Mock<DbSet<Tree>>();
        mockSet.As<IQueryable<Tree>>().Setup(m => m.Provider).Returns(data.Provider);
        mockSet.As<IQueryable<Tree>>().Setup(m => m.Expression).Returns(data.Expression)
;
        mockSet.As<IQueryable<Tree>>().Setup(m => m.ElementType).Returns(data.ElementTyp
e);
        mockSet.As<IQueryable<Tree>>().Setup(m => m.GetEnumerator()).Returns(data.GetEnu
merator());

        var mockContext = new Mock<GardenContext>();
        mockContext.Setup(c => c.Trees).Returns(mockSet.Object);

        var business = new TreeBusiness(mockContext.Object);

        var tree = business.GetTreeByName("Tree1");
        Assert.AreEqual("Tree1", tree.Name);
    }

    [TestCase]
    public void Update_Tree()
    {
        var mockContext = new Mock<GardenContext>(); ;
        var treeBusiness = new TreeBusiness();
        var Tree = new Tree() { Name = "Tree1" };
        try { treeBusiness.Update(Tree); }
        catch { mockContext.Verify(m => m.Entry(It.IsAny<Tree>()), Times.Once()); }
    }

    [TestCase]
    public void Remove_Tree()
    {
        var data = new List<Tree>()
        {
            new Tree{Id=1, Name="Tree1"},
            new Tree{Id=2, Name="Tree2" },
            new Tree{Id=3, Name="Tree3"},
        }.AsQueryable();
```

```
            var mockSet = new Mock<DbSet<Tree>>();
            mockSet.As<IQueryable<Tree>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Tree>>().Setup(m => m.Expression).Returns(data.Expression)
        ;
            mockSet.As<IQueryable<Tree>>().Setup(m => m.ElementType).Returns(data.ElementTyp
        e);
            mockSet.As<IQueryable<Tree>>().Setup(m => m.GetEnumerator()).Returns(data.GetEnu
        merator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(x => x.Trees).Returns(mockSet.Object);

            var business = new TreeBusiness(mockContext.Object);
            var trees = business.GetAllTrees();

            int deletedTreeId = 1; business.Delete(trees[0].Id);

            Assert.IsNull(business.GetAllTrees().FirstOrDefault(x => x.Id == deletedTreeId))
        ;
        }
```

- ShrubTests.cs

```
[TestCase]
        public void Gives_All_Shrubs()
        {
            var data = new List<Shrub>
            {
                new Shrub { Name="First" },
                new Shrub { Name="Second" },
                new Shrub { Name="Third" },
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Shrub>>();
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.Expression).Returns(data.Expression
        );
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.ElementType).Returns(data.ElementTy
        pe);
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.GetEnumerator()).Returns(data.GetEn
        umerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(c => c.Shrubs).Returns(mockSet.Object);

            var business = new ShrubBusiness(mockContext.Object);
            var Shrubs = business.GetAllShrubs();

            Assert.AreEqual(3, Shrubs.Count);
            Assert.AreEqual("First", Shrubs[0].Name);
            Assert.AreEqual("Second", Shrubs[1].Name);
            Assert.AreEqual("Third", Shrubs[2].Name);
        }
```

```
        [TestCase]
        public void Add_Shrub()
        {
            var mockSet = new Mock<DbSet<Shrub>>();
            var shrub = new Shrub();
            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(m => m.Shrubs).Returns(mockSet.Object);

            var business = new ShrubBusiness(mockContext.Object);
            business.Add(shrub);

            mockSet.Verify(m => m.Add(It.IsAny<Shrub>()), Times.Once());
            mockContext.Verify(m => m.SaveChanges(), Times.Once());
        }

        [TestCase]
        public void Gives_Shrub_By_Name()
        {
            var data = new List<Shrub>()
            {
                new Shrub{Id=1, Name="Shrub1"},
                new Shrub{Id=2, Name="Shrub2" },
                new Shrub{Id=3, Name="Shrub3"},
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Shrub>>();
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.Expression).Returns(data.Expression
        );
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.ElementType).Returns(data.ElementTy
        pe);
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.GetEnumerator()).Returns(data.GetEn
        umerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(c => c.Shrubs).Returns(mockSet.Object);

            var business = new ShrubBusiness(mockContext.Object);

            var shrub = business.GetShrubByName("Shrub1");
            Assert.AreEqual("Shrub1", shrub.Name);
        }

        [TestCase]
        public void Update_Shrub()
        {
            var mockContext = new Mock<GardenContext>(); ;
            var shrubBusiness = new ShrubBusiness();
            var Shrub = new Shrub() { Name = "Shrub1" };
            try { shrubBusiness.Update(Shrub); }
            catch { mockContext.Verify(m => m.Entry(It.IsAny<Shrub>()), Times.Once()); }
        }

        [TestCase]
        public void Remove_Shrub()
        {
            var data = new List<Shrub>()
            {
                new Shrub{Id=1, Name="Shrub1"},
                new Shrub{Id=2, Name="Shrub2" },
                new Shrub{Id=3, Name="Shrub3"},
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Shrub>>();
```

```
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.Expression).Returns(data.Expression
      );
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.ElementType).Returns(data.ElementTy
      pe);
            mockSet.As<IQueryable<Shrub>>().Setup(m => m.GetEnumerator()).Returns(data.GetEn
      umerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(x => x.Shrubs).Returns(mockSet.Object);

            var business = new ShrubBusiness(mockContext.Object);
            var shrubs = business.GetAllShrubs();

            int deletedShrubId = 1; business.Delete(shrubs[0].Id);

            Assert.IsNull(business.GetAllShrubs().FirstOrDefault(x => x.Id == deletedShrubId
      ));
        }
```

- CactusTests.cs

```
[TestCase]
        public void Gives_All_Flowers()
        {
            var data = new List<Cactus>
            {
                new Cactus{ Name="First" },
                new Cactus { Name="Second" },
                new Cactus { Name="Third" },
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Cactus>>();
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.Expression).Returns(data.Expressio
      n);
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.ElementType).Returns(data.ElementT
      ype);
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.GetEnumerator()).Returns(data.GetE
      numerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(c => c.Cactuses).Returns(mockSet.Object);
            var business = new CactusBusiness(mockContext.Object);
            var Cactuses = business.GetAllCactuses();

            Assert.AreEqual(3, Cactuses.Count);
            Assert.AreEqual("First", Cactuses[0].Name);
            Assert.AreEqual("Second", Cactuses[1].Name);
            Assert.AreEqual("Third", Cactuses[2].Name);
        }

        [TestCase]
```

```
        public void Add_Cactus()
        {
            var mockSet = new Mock<DbSet<Cactus>>();
            var cactus = new Cactus();
            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(m => m.Cactuses).Returns(mockSet.Object);

            var business = new CactusBusiness(mockContext.Object);
            business.Add(cactus);

            mockSet.Verify(m => m.Add(It.IsAny<Cactus>()), Times.Once());
            mockContext.Verify(m => m.SaveChanges(), Times.Once());
        }

        [TestCase]
        public void Gives_Cactus_By_Name()
        {
            var data = new List<Cactus>()
            {
                new Cactus{Id=1, Name="Cactus1"},
                new Cactus{Id=2, Name="Cactus2" },
                new Cactus{Id=3, Name="Cactus3"},
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Cactus>>();
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.Expression).Returns(data.Expressio
        n);
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.ElementType).Returns(data.ElementT
        ype);
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.GetEnumerator()).Returns(data.GetE
        numerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(c => c.Cactuses).Returns(mockSet.Object);

            var business = new CactusBusiness(mockContext.Object);

            var cactus = business.GetCactusByName("Cactus1");
            Assert.AreEqual("Cactus1", cactus.Name);
        }

        [TestCase]
        public void Update_Cactus()
        {
            var mockContext = new Mock<GardenContext>(); ;
            var cactusBusiness = new CactusBusiness();
            var Cactus = new Cactus() { Name = "Cactus1" };
            try { cactusBusiness.Update(Cactus); }
            catch { mockContext.Verify(m => m.Entry(It.IsAny<Cactus>()), Times.Once()); }
        }

        [TestCase]
        public void Remove_Cactus()
        {
            var data = new List<Cactus>()
            {
                new Cactus{Id=1, Name="Cactus1"},
                new Cactus{Id=2, Name="Cactus2" },
                new Cactus{Id=3, Name="Cactus3"},
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Cactus>>();
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.Provider).Returns(data.Provider);
```

```
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.Expression).Returns(data.Expressio
      n);
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.ElementType).Returns(data.ElementT
      ype);
            mockSet.As<IQueryable<Cactus>>().Setup(m => m.GetEnumerator()).Returns(data.GetE
      numerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(x => x.Cactuses).Returns(mockSet.Object);

            var business = new CactusBusiness(mockContext.Object);
            var cactuses = business.GetAllCactuses();

            int deletedCactusId = 1; business.Delete(cactuses[0].Id);

            Assert.IsNull(business.GetAllCactuses().FirstOrDefault(x => x.Id == deletedCactu
      sId));
        }
```

- GrassTests.cs

```
[TestCase]
        public void Gives_All_Flowers()
        {
            var data = new List<Grass>
            {
                new Grass{ Name="First" },
                new Grass { Name="Second" },
                new Grass { Name="Third" },
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Grass>>();
            mockSet.As<IQueryable<Grass>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Grass>>().Setup(m => m.Expression).Returns(data.Expression
      );
            mockSet.As<IQueryable<Grass>>().Setup(m => m.ElementType).Returns(data.ElementTy
      pe);
            mockSet.As<IQueryable<Grass>>().Setup(m => m.GetEnumerator()).Returns(data.GetEn
      umerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(c => c.Grasses).Returns(mockSet.Object);
            var business = new GrassBusiness(mockContext.Object);
            var Grasses = business.GetAllGrasses();

            Assert.AreEqual(3, Grasses.Count);
            Assert.AreEqual("First", Grasses[0].Name);
            Assert.AreEqual("Second", Grasses[1].Name);
            Assert.AreEqual("Third", Grasses[2].Name);
        }

        [TestCase]
        public void Add_Grass()
```

```
        {
            var mockSet = new Mock<DbSet<Grass>>();
            var grass = new Grass();
            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(m => m.Grasses).Returns(mockSet.Object);

            var business = new GrassBusiness(mockContext.Object);
            business.Add(grass);

            mockSet.Verify(m => m.Add(It.IsAny<Grass>()), Times.Once());
            mockContext.Verify(m => m.SaveChanges(), Times.Once());
        }

        [TestCase]
        public void Gives_Grass_By_Name()
        {
            var data = new List<Grass>()
            {
                new Grass{Id=1, Name="Grass1"},
                new Grass{Id=2, Name="Grass2" },
                new Grass{Id=3, Name="Grass3"},
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Grass>>();
            mockSet.As<IQueryable<Grass>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Grass>>().Setup(m => m.Expression).Returns(data.Expression
        );
            mockSet.As<IQueryable<Grass>>().Setup(m => m.ElementType).Returns(data.ElementTy
        pe);
            mockSet.As<IQueryable<Grass>>().Setup(m => m.GetEnumerator()).Returns(data.GetEn
        umerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(c => c.Grasses).Returns(mockSet.Object);

            var business = new GrassBusiness(mockContext.Object);

            var grass = business.GetGrassByName("Grass1");
            Assert.AreEqual("Grass1", grass.Name);
        }

        [TestCase]
        public void Update_Grass()
        {
            var mockContext = new Mock<GardenContext>(); ;
            var grassBusiness = new GrassBusiness();
            var Grass = new Grass() { Name = "Grass1" };
            try { grassBusiness.Update(Grass); }
            catch { mockContext.Verify(m => m.Entry(It.IsAny<Grass>()), Times.Once()); }
        }

        [TestCase]
        public void Remove_Grass()
        {
            var data = new List<Grass>()
            {
                new Grass{Id=1, Name="Grass1"},
                new Grass{Id=2, Name="Grass2" },
                new Grass{Id=3, Name="Grass3"},
            }.AsQueryable();

            var mockSet = new Mock<DbSet<Grass>>();
            mockSet.As<IQueryable<Grass>>().Setup(m => m.Provider).Returns(data.Provider);
            mockSet.As<IQueryable<Grass>>().Setup(m => m.Expression).Returns(data.Expression
        );
```

```
            mockSet.As<IQueryable<Grass>>().Setup(m => m.ElementType).Returns(data.ElementTy
        pe);
            mockSet.As<IQueryable<Grass>>().Setup(m => m.GetEnumerator()).Returns(data.GetEn
        umerator());

            var mockContext = new Mock<GardenContext>();
            mockContext.Setup(x => x.Grasses).Returns(mockSet.Object);

            var business = new GrassBusiness(mockContext.Object);
            var grasses = business.GetAllGrasses();

            int deletedGrassId = 1; business.Delete(grasses[0].Id);

            Assert.IsNull(business.GetAllGrasses().FirstOrDefault(x => x.Id == deletedGrassI
        d));
          }
```

Botanical Garden