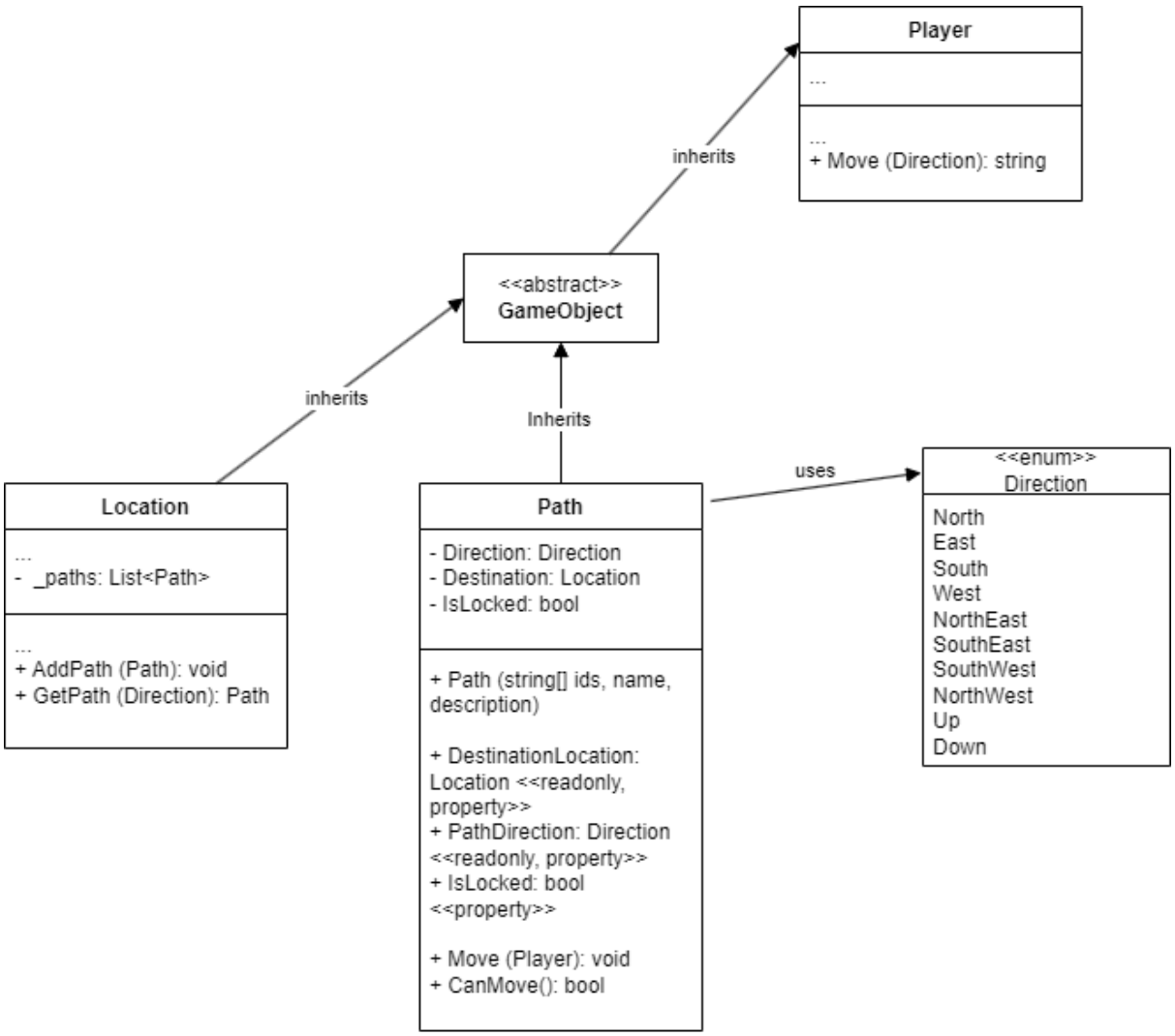
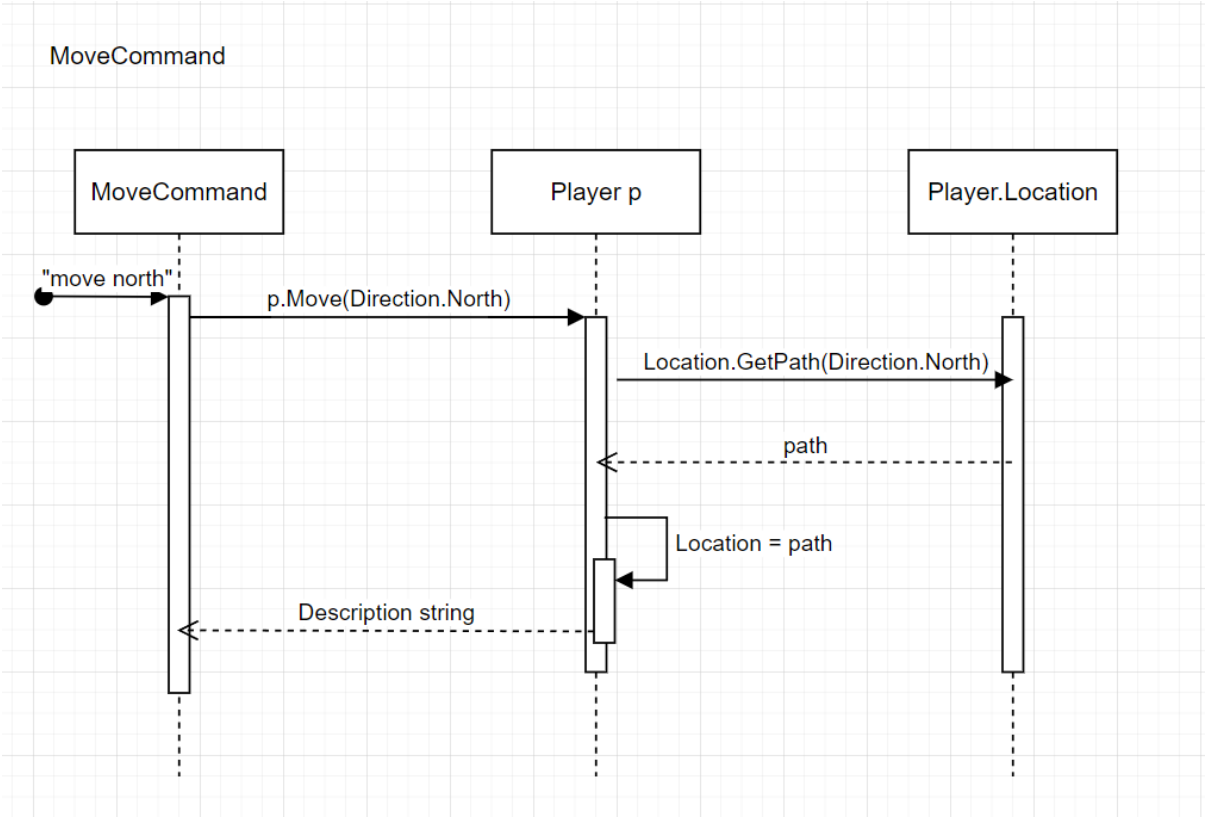
9.2 Path Implementation

Class Diagram



Move Command Sequence Diagram



Path

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace SwinAdventure
{
    public enum Direction
    {
        North, NorthEast, East, SouthEast, South, SouthWest, West, NorthWest, Up,
Down
    }
    public class Path : GameObject
    {
        private Direction Direction;
        private Location Destination;

        public bool IsLocked { get; set; } = false;

        public Path(Direction direction, string name, string description,
Location destination) : base(new string[] { direction.ToString()}, name,
description)
        {
            Direction = direction;
```

```
            Destination = destination;
        }

        public Location DestinationLocation
        {
            get
            {
                return Destination;
            }
        }

        public Direction PathDirection
        {
            get
            {
                return Direction;
            }
        }

        public bool CanMove()
        {
            return !IsLocked;
        }

        public void Move(Player p)
        {
            p.Location = DestinationLocation;
        }
    }
}
```

UnitTest

```
using SwinAdventure;
using Path = SwinAdventure.Path;


namespace TestQueue
{
  public class Tests
  {
    Item item1 = new Item(new string[] { "sword" }, "sword", "a sword");
    Item item2 = new Item(new string[] { "shield" }, "shield", "a shield");
    Item item3 = new Item(new string[] { "shiba" }, "shiba", "a shiba");
    Item item4 = new Item(new string[] { "gem" }, "gem", "a gem");


    [SetUp]
    public void Setup()
```

```
{
}

// Test the Item class
[Test]
public void ItemIdentifiable()
{
   Assert.IsTrue(item1.AreYou("sword"));
}

[Test]
public void ShortDescription()
{
   Assert.That(item1.ShortDescription, Is.EqualTo("a sword (sword)"));
}

[Test]
public void FullDescription()
{
   Assert.That(item1.FullDescription, Is.EqualTo("a sword"));
}

// Test the Inventory class
[Test]
public void FindItem()
{
   Inventory inventory = new Inventory();
   inventory.Put(item1);

   Assert.IsTrue(inventory.HasItem("sword"));
}
```

```
[Test]
public void NoItem()
{
   Inventory inventory = new Inventory();
   Assert.IsFalse(inventory.HasItem("sword"));
}

[Test]
public void FetchItem()
{
   Inventory inventory = new Inventory();
   inventory.Put(item1);

   Assert.That(item1, Is.EqualTo(inventory.Fetch("sword")));
   Assert.IsTrue(inventory.HasItem("sword"));
}

[Test]
public void TakeItem()
{
   Inventory inventory = new Inventory();
   inventory.Put(item1);

   Assert.That(item1, Is.EqualTo(inventory.Take("sword")));
   Assert.IsFalse(inventory.HasItem("sword"));
}

[Test]
public void ItemList()
{
```

```
        Inventory inventory = new Inventory();
        inventory.Put(item1);
        inventory.Put(item2);

        //the list string below is the expected output, consisting of every item in the following format: name ( first id)
        Assert.That(inventory.ItemList, Is.EqualTo("\t a sword (sword)\n\t a shield (shield)\n"));

    }

    // Test the Player class
    [Test]
    public void PlayerIdentifiable()
    {
        Player player = new Player("Tan", "A player");

        Assert.IsTrue(player.AreYou("me"));
        Assert.IsTrue(player.AreYou("inventory"));
    }


    [Test]
    public void PlayerLocate()
    {
        Player player = new Player("Tan", "A player");
        player.Inventory.Put(item1);

        Assert.That(item1, Is.EqualTo(player.Locate("sword")));
    }
```

```
    [Test]
    public void PlayerLocateItself()
    {
        Player player = new Player("Tan", "A player");
        Assert.That(player, Is.EqualTo(player.Locate("me")));
        Assert.That(player, Is.EqualTo(player.Locate("inventory")));
    }

    [Test]
    public void PlayerLocateNothing()
    {
        Player player = new Player("Tan", "A player");
        Assert.That(player.Locate("sword"), Is.Null);
    }

    [Test]
    public void PlayerFullDescription()
    {
        Player player = new Player("Tan", "A player");
        player.Inventory.Put(item1);
        player.Inventory.Put(item2);

        //the list string below is the expected output, consisting of every item in the following format: name ( first id)
        Assert.That(player.FullDescription, Is.EqualTo("You are Tan A player\nYou are carrying:\n\t a sword (sword)\n\t a shield (shield)\n"));
    }

    //Test the Bag class
    [Test]
    public void BagLocate()
    {
```

```
    Bag backpack = new Bag(new string[] { "backpack" }, "backpack", "a backpack");
    backpack.Inventory.Put(item1);
    backpack.Inventory.Put(item2);
    backpack.Inventory.Put(item3);

    //ask to return item and item stays in backpack
    Assert.That(item3, Is.EqualTo(backpack.Locate("shiba")));
    Assert.IsTrue(backpack.Inventory.HasItem("shiba"));

}

[Test]
public void BagLocatesItself()
{
    Bag backpack = new Bag(new string[] { "backpack" }, "backpack", "a backpack");
    Assert.That(backpack, Is.EqualTo(backpack.Locate("backpack")));
}

[Test]
public void BagLocateNothing()
{
    Bag backpack = new Bag(new string[] { "backpack" }, "backpack", "a backpack");
    Assert.That(backpack.Locate("sword"), Is.Null);
}

[Test]
public void BagFullDescription()
{
    Bag backpack = new Bag(new string[] { "backpack" }, "backpack", "A backpack");
    backpack.Inventory.Put(item1);
    backpack.Inventory.Put(item2);
```

```
        backpack.Inventory.Put(item3);


        //the list string below is the expected output, consisting of every item in the following format: name ( first id)
        Assert.That(backpack.FullDescription, Is.EqualTo("A backpack\nYou look in the backpack and see:\n\t a sword (sword)\n\t a shield (shield)\n\t a shiba (shiba)\n"));
    }


    [Test]
    public void BagInBag()
    {
        Bag backpack = new Bag(new string[] { "backpack" }, "backpack", "a backpack");
        Bag satchel = new Bag(new string[] { "satchel" }, "satchel", "a satchel");


        backpack.Inventory.Put(satchel);


        Assert.That(satchel, Is.EqualTo(backpack.Locate("satchel")));
    }


    //Test for the LookCommand class
    [Test]
    public void LookAtMe()
    {
        Player player = new Player("Tan", "A player");
        player.Inventory.Put(item1);
        player.Inventory.Put(item2);
        LookCommand LookCommand = new LookCommand();


        string expectedDescription = "You are Tan A player\nYou are carrying:\n\t a sword (sword)\n\t a shield (shield)\n";
        string testDescription = LookCommand.Execute(player, new string[] { "look", "at", "me" });
        Assert.That(testDescription, Is.EqualTo(expectedDescription));
```

```
}

[Test]
public void LookAtGem()
{
   Player player = new Player("Tan", "A player");
   player.Inventory.Put(item4);
   LookCommand LookCommand = new LookCommand();

   string expectedDescription = "a gem";
   string testDescription = LookCommand.Execute(player, new string[] { "look", "at", "gem" });
   Assert.That(testDescription, Is.EqualTo(expectedDescription));
}

[Test]
public void LookAtUnk()
{
   Player player = new Player("Tan", "A player");
   LookCommand LookCommand = new LookCommand();

   string expectedDescription = "I can't find the gem in the Tan";
   string testDescription = LookCommand.Execute(player, new string[] { "look", "at", "gem" });
   Assert.That(testDescription, Is.EqualTo(expectedDescription));
}

[Test]
public void LookAtGemInBag()
{
   Player player = new Player("Tan", "A player");
   Bag backpack = new Bag(new string[] { "backpack" }, "backpack", "a backpack");
```

```
        player.Inventory.Put(backpack);
        backpack.Inventory.Put(item4);
        LookCommand LookCommand = new LookCommand();

        string expectedDescription = "a gem";
        string testDescription = LookCommand.Execute(player, new string[] { "look", "at", "gem",
"in", "backpack" });
        Assert.That(testDescription, Is.EqualTo(expectedDescription));
    }

    [Test]
    public void LookAtBag()
    {
        Player player = new Player("Tan", "A player");
        Bag backpack = new Bag(new string[] { "backpack" }, "backpack", "A backpack");
        backpack.Inventory.Put(item1);
        backpack.Inventory.Put(item2);
        player.Inventory.Put(backpack);
        LookCommand LookCommand = new LookCommand();

        string expectedDescription = "A backpack\nYou look in the backpack and see:\n\t a sword
(sword)\n\t a shield (shield)\n";
        string testDescription = LookCommand.Execute(player, new string[] { "look", "at",
"backpack" });
        Assert.That(testDescription, Is.EqualTo(expectedDescription));
    }

    [Test]
    public void LookAtGemInNoBag()
    {
        Player player = new Player("Tan", "A player");
        LookCommand LookCommand = new LookCommand();
```

```
        string expectedDescription = "I can't find the backpack";
        string testDescription = LookCommand.Execute(player, new string[] { "look", "at", "gem",
"in", "backpack" });
        Assert.That(testDescription, Is.EqualTo(expectedDescription));
    }

    [Test]
    public void LookAtNoGemInBag()
    {
        Player player = new Player("Tan", "A player");
        Bag backpack = new Bag(new string[] { "backpack" }, "backpack", "a backpack");
        player.Inventory.Put(backpack);
        LookCommand LookCommand = new LookCommand();

        string expectedDescription = "I can't find the gem in the backpack";
        string testDescription = LookCommand.Execute(player, new string[] { "look", "at", "gem",
"in", "backpack" });
        Assert.That(testDescription, Is.EqualTo(expectedDescription));
    }

    [Test]
    public void InvalidLookCommand()
    {
        Player player = new Player("Tan", "A player");
        LookCommand LookCommand = new LookCommand();

        string expectedDescription = "I don't know how to look like that";

        //only 2 arguments
        string testDescription = LookCommand.Execute(player, new string[] { "look", "at" });
        Assert.That(testDescription, Is.EqualTo(expectedDescription));
```

```
        //4 arguments
        string testDescription2 = LookCommand.Execute(player, new string[] { "look", "at", "gem",
"in" });
        Assert.That(testDescription2, Is.EqualTo(expectedDescription));

        //5 arguments but the 4th argument is not "in"
        string testDescription3 = LookCommand.Execute(player, new string[] { "look", "at", "a", "at",
"b" });
        string expectedDescription2 = "What do you want to look in?";
        Assert.That(testDescription3, Is.EqualTo(expectedDescription2));

        //5 arguments but the 2nd argument is not "at"
        string testDescription4 = LookCommand.Execute(player, new string[] { "look", "in", "a", "in",
"b" });
        string expectedDescription3 = "What do you want to look at?";
        Assert.That(testDescription4, Is.EqualTo(expectedDescription3));
    }

    //Test for Location
    [Test]
    public void LookInPlayerLocationForItem()
    {
        Player player = new Player("Tan", "A player");
        player.Location = new Location(new string[] { "Garden" }, "Garden", "A garden filled with
butterflies");
        player.Location.Inventory.Put(item1);

        LookCommand LookCommand = new LookCommand();
        string textDescription = LookCommand.Execute(player, new string[] { "look", "at", "sword"
});
        string expectedDescription = "a sword";
        Assert.That(textDescription, Is.EqualTo(expectedDescription));
```

```
    }

    [Test]
    public void LookInPlayerLocationForBag()
    {
        Player player = new Player("Tan", "A player");
        player.Location = new Location(new string[] { "Garden" }, "Garden", "A garden filled with
butterflies");

        Bag backpack = new Bag(new string[] { "backpack" }, "backpack", "a backpack");
        backpack.Inventory.Put(item1);

        player.Location.Inventory.Put(backpack);

        LookCommand LookCommand = new LookCommand();
        string textDescription = LookCommand.Execute(player, new string[] { "look", "at", "sword",
"in", "backpack" });
        string expectedDescription = "a sword";
        Assert.That(textDescription, Is.EqualTo(expectedDescription));
    }

    [Test]
    public void LookInPlayerLocationForPlayerLocationWhichHasItem()
    {
        Player player = new Player("Tan", "A player");
        player.Location = new Location(new string[] { "Garden" }, "Garden", "A garden filled with
butterflies");

        player.Location.Inventory.Put(item1);

        LookCommand LookCommand = new LookCommand();
```

```
        string textDescription = LookCommand.Execute(player, new string[] { "look", "at", "sword",
"in", "Garden" });

        string expectedDescription = "a sword";

        Assert.That(textDescription, Is.EqualTo(expectedDescription));

    }


    [Test]

    public void LocationIdentifyItself()

    {

        Location location = new Location(new string[] { "Garden" }, "Garden", "A garden filled with
butterflies");

        Assert.IsTrue(location.AreYou("Garden"));

    }


    [Test]

    public void LocateItemInPlayerLocation()

    {

        Player player = new Player("Tan", "A player");

        player.Location = new Location(new string[] { "Garden" }, "Garden", "A garden filled with
butterflies");

        player.Location.Inventory.Put(item1);


        Assert.That(item1, Is.EqualTo(player.Location.Locate("sword")));

    }


    //Test for MoveCommand

    [Test]

    public void MoveToLocation()

    {

        Player player = new Player("Tan", "A player");

        Location Garden = new Location(new string[] { "Garden" }, "Garden", "A garden filled with
butterflies");
```

```
        Location Forest = new Location(new string[] { "Forest" }, "Forest", "A forest filled with trees");
        player.Location = Garden;

        Path path = new Path(Direction.North, "north", "You go through a door", Forest);
        player.Location.AddPath(path);

        MoveCommand moveCommand = new MoveCommand();
        string textDescription = moveCommand.Execute(player, new string[] { "move", "north" });
        string expectedDescription = "You head North\nYou go through a door\nYou have arrived in a small Forest";
        Assert.That(textDescription, Is.EqualTo(expectedDescription));
    }

    [Test]
    public void GetPathFromLocation()
    {
        Location Garden = new Location(new string[] { "Garden" }, "Garden", "A garden filled with butterflies");
        Location Forest = new Location(new string[] { "Forest" }, "Forest", "A forest filled with trees");

        Path path = new Path(Direction.NorthEast, "northeast", "You go through a door", Forest);
        Garden.AddPath(path);

        Assert.That(path, Is.EqualTo(Garden.GetPath(Direction.NorthEast)));
    }

    [Test]
    public void PathMovePlayer()
    {
        Player player = new Player("Tan", "A player");
```

```
        Location Garden = new Location(new string[] { "Garden" }, "Garden", "A garden filled with
butterflies");
        Location Forest = new Location(new string[] { "Forest" }, "Forest", "A forest filled with
trees");
        player.Location = Garden;


        Path path = new Path(Direction.West, "west", "You go through a door", Forest);




        path.Move(player);
        Assert.That(player.Location, Is.EqualTo(Forest));
    }


    [Test]
    public void PlayerLocationDontChange()
    {
        Player player = new Player("Tan", "A player");
        Location Garden = new Location(new string[] { "Garden" }, "Garden", "A garden filled with
butterflies");
        Location Forest = new Location(new string[] { "Forest" }, "Forest", "A forest filled with
trees");
        player.Location = Garden;


        Path path = new Path(Direction.North, "north", "You go through a door", Forest);
        player.Location.AddPath(path);


        MoveCommand moveCommand = new MoveCommand();
        string textDescription = moveCommand.Execute(player, new string[] { "move", "south" });
        Assert.That(player.Location, Is.EqualTo(Garden));
    }
  }
}
```

Location

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Xml.Linq;
using static SwinAdventure.LookCommand;

namespace SwinAdventure
{
    public class Location : GameObject, IHaveInventory
    {
        private Inventory _inventory = new Inventory();
        private List<Path> _paths = new List<Path>();

        public Location(string[] ids, string name, string description) :
base(ids, name, description)
        {
        }

        public List<Path> Paths
        {
            get
            {
                return _paths;
            }
        }

        public void AddPath(Path path)
        {
            _paths.Add(path);
        }

        public Path? GetPath (Direction Direction)
        {
            foreach (Path path in Paths)
            {
                if (path.AreYou(Direction.ToString()))
                {
                    return path;
                }
            }
            return null;
        }

        public Inventory Inventory
        {
            get
            {
                return _inventory;
            }
        }

        public GameObject? Locate(string id)
        {
            if (AreYou(id))
            {
                   return this;
            }
            return _inventory.Fetch(id);
```

```
        }

        public string GetExits()
        {
            string exits = "";
            foreach (Path path in _paths)
            {
                exits += path.PathDirection.ToString() + ", ";
            }
            return exits;
        }

        public override string FullDescription
        {
            get
            {
                return "You are in a small" + Name + "\n" + Description + "\n" +
"There are exits to the " + GetExits() +  ".\n\n" + "In this room you can see:\n"
+ Inventory.ItemList;
            }
        }

        GameObject? IHaveInventory.Locate(string id)
        {
            return Locate(id);
        }

        string IHaveInventory.Name
        {
            get
            {
                return Name;
            }
        }
    }
}
```

MoveCommand

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace SwinAdventure
{
    public class MoveCommand : Command
    {
        public MoveCommand() : base(new string[] { "move, go, head, leave" })
        {
        }

        public override string Execute(Player p, string[] text)
        {
            if (text.Length != 2)
            {
                return "I don't know how to move like that";
            }
            else if (text[0].ToLower() != "move" && text[0].ToLower() != "go" &&
text[0].ToLower() != "head" && text[0].ToLower() != "leave")
```

```
            {
                return "Error in move input";
            }
            else if (text[1].ToLower() != "north" && text[1].ToLower() != "south"
&& text[1].ToLower() != "east" && text[1].ToLower() != "west")
            {
                return "I don't know how to move like that";
            }
            else
            {
                if (text[1].ToLower() == "north" || text[1].ToLower() == "n")
                {
                    return p.Move(Direction.North);
                }
                else if (text[1].ToLower() == "south" || text[1].ToLower() ==
"s")
                {
                    return p.Move(Direction.South);
                }
                else if (text[1].ToLower() == "east" || text[1].ToLower() == "e")
                {
                    return p.Move(Direction.East);
                }
                else if (text[1].ToLower() == "west" || text[1].ToLower() == "w")
                {
                    return p.Move(Direction.West);

                } else if (text[1].ToLower() == "northeast" || text[1].ToLower()
== "ne")
                {
                    return p.Move(Direction.NorthEast);

                } else if (text[1].ToLower() == "northwest" || text[1].ToLower()
== "nw")
                {
                    return p.Move(Direction.NorthWest);

                } else if (text[1].ToLower() == "southeast" || text[1].ToLower()
== "se")
                {
                    return p.Move(Direction.SouthEast);

                } else if (text[1].ToLower() == "southwest" || text[1].ToLower()
== "sw")
                {
                    return p.Move(Direction.SouthWest);

                } else if (text[1].ToLower() == "up")
                {
                    return p.Move(Direction.Up);

                } else if (text[1].ToLower() == "down")
                {
                    return p.Move(Direction.Down);

                } else
                {
                    return "I don't know how to move like that";
                }
            }
        }
    }
}
```

Look Command

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace SwinAdventure
{
    public class LookCommand : Command
    {
        public LookCommand() : base(new string[] { "look" })
        {
        }

        public override string Execute(Player p, string[] text)
        {
            if (text.Length != 3 && text.Length != 5)
            {
                return "I don't know how to look like that";
            }
            else if (text[0].ToLower() != "look")
            {
                return "Error in look input";
            }
            else if (text[1].ToLower() != "at")
            {
                return "What do you want to look at?";
            }
            else if (text.Length == 3)
            {
                return LookAtIn(text[2], p);
            }
            else if (text.Length == 5)
            {
                if (text[3].ToLower() != "in")
                {
                    return "What do you want to look in?";
                }
                else
                {
                    IHaveInventory container = FetchContainer(p, text[4]) as
IHaveInventory;

                    // Check if container is null after the cast
                    if (container == null)
                    {
                        return "I can't find the " + text[4];
                    }
                    else
                    {
                        // Look at the thing in the container
                        return LookAtIn(text[2], container);
                    }
                }
            }
            //default return
            return "I don't know how to look like that";
        }
```

```
        public IHaveInventory? FetchContainer(Player p, string containerId)
        {
            if (p.Locate(containerId) != null)
            {
                return p.Locate(containerId) as IHaveInventory;
            }
            else
            {
                return null;
            }
        }

        public string LookAtIn(string thingId, IHaveInventory containerId)
        {
            GameObject? thing = containerId.Locate(thingId);

            if (thing == null)
            {
                return "I can't find the " + thingId + " in the " +
containerId.Name;
            }
            else
            {
                return thing.FullDescription;
            }
        }

        public interface IHaveInventory
        {
            GameObject? Locate(string id);

            string Name { get; }
        }


    }
}
```

Command

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace SwinAdventure
{
    public abstract class Command : IdentifiableObject
    {
        public Command(string[] ids) : base(ids)
        {
        }

        public abstract string Execute(Player p, string[] text);


    }
}
```

Player

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using static SwinAdventure.LookCommand;

namespace SwinAdventure
{
    public class Player : GameObject, IHaveInventory
    {
        private Inventory _inventory = new Inventory();
        private Location _location;

        public Player(string name, string desc) : base(new string[] { "me",
"inventory" }, name, desc)
        {

        }

        public string Move (Direction direction)
        {
            Path? path = Location.GetPath(direction);

            if (path == null)
            {
                return "There is no path in that direction";
            }
            else
            {
                Location = path.DestinationLocation;
                return "You head " + path.PathDirection.ToString() + "\n" +
path.FullDescription + "\nYou have arrived in a small " +
path.DestinationLocation.Name;
            }
        }

        public Location Location
        {
            get
            {
                return _location;
            }
            set
            {
                _location = value;
            }
        }

        public Inventory Inventory
        {
            get
            {
                return _inventory;
            }
        }

        public GameObject? Locate(string id)
        {
            if (AreYou(id))
```

```
            {
                return this;
            }
            else if (Inventory.HasItem(id))
            {
                return Inventory.Fetch(id);
            }
            else if (Location != null)
            {
                    return Location.Locate(id);
            }
            else
            {
                return null;
            }
        }

        public override string FullDescription
        {
            get
            {
                return "You are " + Name + " " + Description + "\nYou are
carrying:\n" + _inventory.ItemList;
            }
        }

        GameObject? IHaveInventory.Locate(string id)
        {
            return Locate(id);
        }

        string IHaveInventory.Name
        {
            get
            {
                return Name;
            }
        }
    }
}
```

Program

```
namespace SwinAdventure
{
    internal class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Enter the player's name:");
            string? playerName = Console.ReadLine();

            Console.WriteLine("Enter the player's description:");
            string? playerDescription = Console.ReadLine();

            Player player = new Player(playerName, playerDescription);

            Item shiba = new Item(new string[] { "shiba", "dog" }, "Shiba", "A
cute shiba inu");
            Item nitendo = new Item(new string[] { "switch", "nitendo" },
"Nitendo Switch", "A gaming console");

            player.Inventory.Put(shiba);
```

```
            player.Inventory.Put(nitendo);

            Bag container = new Bag(new string[] { "bag", "container" }, "Bag",
"A metal container");
            player.Inventory.Put(container);

            Item staff = new Item(new string[] { "staff", "stick" }, "Staff", "A
wooden (magical?) staff");
            Item glasses = new Item(new string[] { "glasses", "spectacles" },
"Glasses", "A pair of glasses");

            container.Inventory.Put(staff);
            container.Inventory.Put(glasses);

            while (true)
            {
                Console.WriteLine("Enter a command:");
                string? command = Console.ReadLine();
                // Split the command into an array of words contained within the
command
                string[] convertedCommand = command.Split(' ');
                LookCommand lookCommand = new LookCommand();

                Console.WriteLine(lookCommand.Execute(player, convertedCommand));

            }
        }
    }
}
```

Bag

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using static SwinAdventure.LookCommand;

namespace SwinAdventure
{
    public class Bag : Item, IHaveInventory
    {
        private Inventory _inventory = new Inventory();

        public Bag(string[] idents, string name, string desc) : base(idents,
name, desc)
        {
        }

        public Item? Locate(string id)
        {
            if (AreYou(id))
            {
                return this;
            }
           else
                return _inventory.Fetch(id);
        }

        public override string FullDescription
```

```
        {
            get
            {
                if (Inventory.ItemList == "")
                {
                    return Description + "The " + Name + " is empty.";
                }
                else
                return Description + "\nYou look in the " + Name + " and see:\n"
+ _inventory.ItemList;
            }
        }

        public Inventory Inventory
        {
            get
            {
                return _inventory;
            }
        }

        GameObject? IHaveInventory.Locate(string id)
        {
            return Locate(id);
        }

        string IHaveInventory.Name
        {
            get
            {
                return Name;
            }
        }
    }
}
```

Inventory

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace SwinAdventure
{
    public class Inventory
    {
        private List<Item> _items = new List<Item>();

        public Inventory()
        {
        }

        public string ItemList
        {
            get
            {
                string list = "";
                foreach (Item item in _items)
                {
```

```
                list += "\t " + item.ShortDescription + "\n";
            }
            return list;
        }
    }
    public bool HasItem(string id)
    {
        foreach (Item item in _items)
        {
            if (item.AreYou(id))
            {
                return true;
            }
        }
        return false;
    }

    public void Put(Item itm)
    {
        _items.Add(itm);
    }

    public Item? Take(string id)
    {
        foreach (Item item in _items)
        {
            if (item.AreYou(id))
            {
                _items.Remove(item);
                return item;
            }
        }
        return null;
    }

    public Item? Fetch(string id)
    {
        foreach (Item item in _items)
        {
            if (item.AreYou(id))
            {
                return item;
            }
        }
        return null;
    }
}
}
```

GameObject

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace SwinAdventure
{

    public class GameObject : IdentifiableObject
```

```
    {
        private string _name;
        private string _description;

        public GameObject(string[] idents, string name, string desc) :
base(idents)
        {
            _name = name;
            _description = desc;
        }

        public string Name
        {
            get
            {
                return _name;
            }
        }

        public string Description
        {
            get
            {
                return _description;
            }
        }

        public string ShortDescription
        {
            get
            {
                return Description + " (" + FirstId + ")";
            }
        }

        public virtual string FullDescription
        {
            get
            {
                return Description;
            }
        }


    }
}
```

Identifiable Object

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace SwinAdventure
{
    public abstract class IdentifiableObject
    {
        private List<string> _identifiers = new List<string>();
```

```
        public IdentifiableObject(string[] idents)
        {
            foreach (string id in idents)
            {
                AddIdentifier(id.ToLower());
            }
        }

        public bool AreYou(string id)
        {
            return _identifiers.Contains(id.ToLower());
        }

        public string FirstId
        {
            get
            {
                if (_identifiers.Count > 0)
                {
                    return _identifiers[0];
                }
                else
                {
                    return "";
                }
            }
        }

        public void AddIdentifier(string id)
        {
            _identifiers.Add(id.ToLower());
        }
    }
}
```

Item

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;


namespace SwinAdventure;
    public class Item : GameObject
    {
        public Item(string[] idents, string name, string desc) : base(idents,
name, desc)
        {
        }

    }
```