GAME PROGRAMMING LAB 7

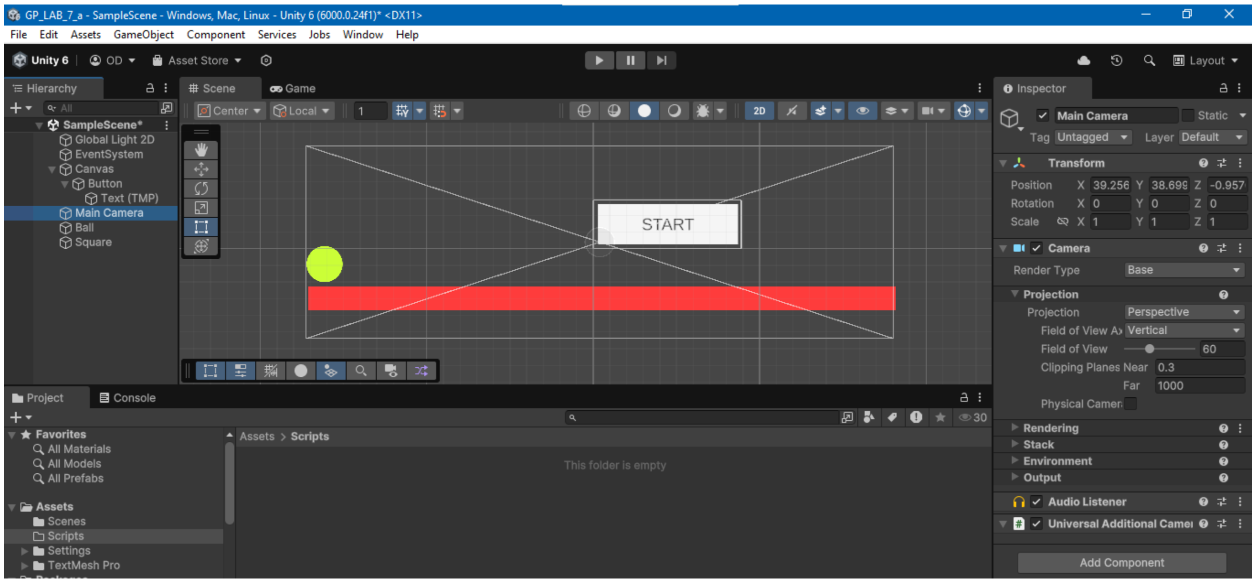
SHUFFLEBOARD 2D GAME AND 3D PHYSICS,LIGHT AND TEXTURES

NAME : OM SUBRATO DEY

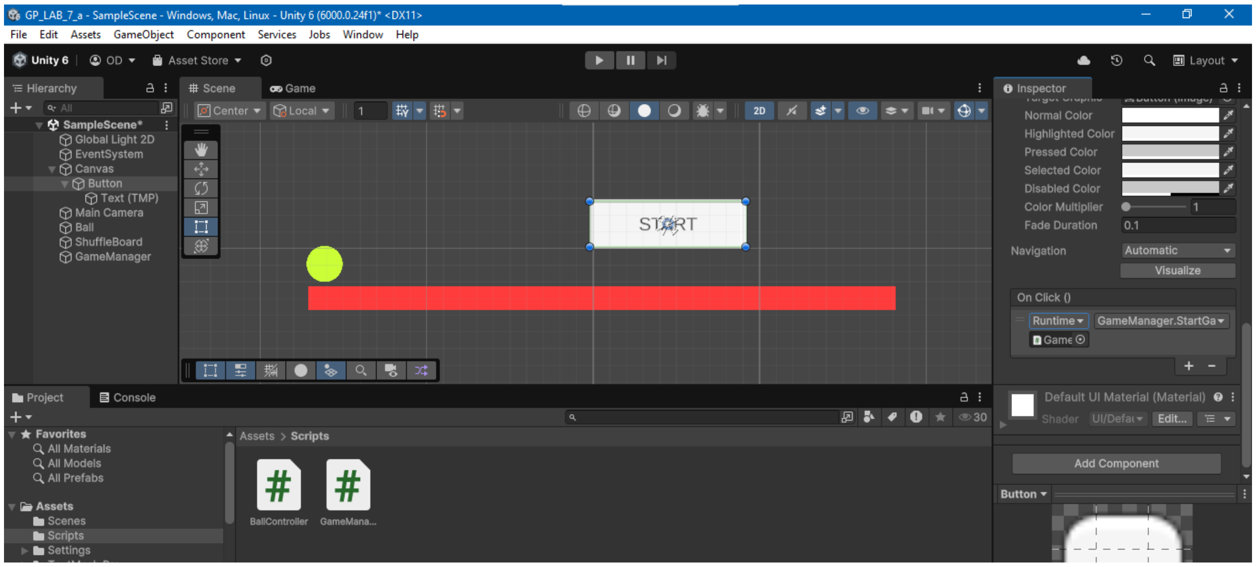
REGISTER NO.: 21BAI1876

SHUFFLEBOARD 2D GAME:

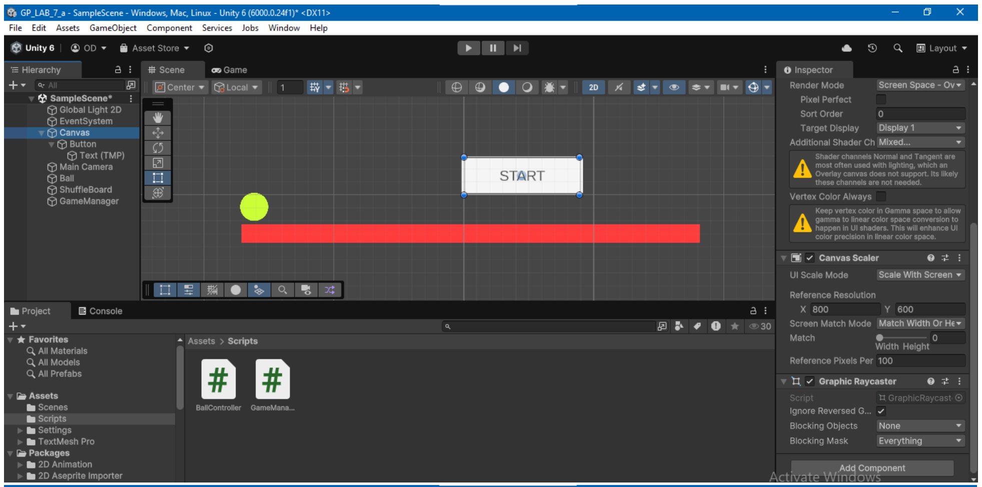
Adding all the necessary scripts, game objects, buttons and creating the required environment.



Position X 39.256 Y 38.699 Z -0.957
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1
Render Type Base
Projection Perspective
Field of View Axis Vertical
Field of View 60
Clipping Planes Near 0.3
Far 1000



Color Multiplier 1
Fade Duration 0.1
Navigation Automatic
On Click ()
Runtime GameManager.StartGa


GP_LAB_7_a - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

Hierarchy: SampleScene*, Global Light 2D, EventSystem, Canvas, Button, Text (TMP), Main Camera, Ball, ShuffleBoard, GameManager

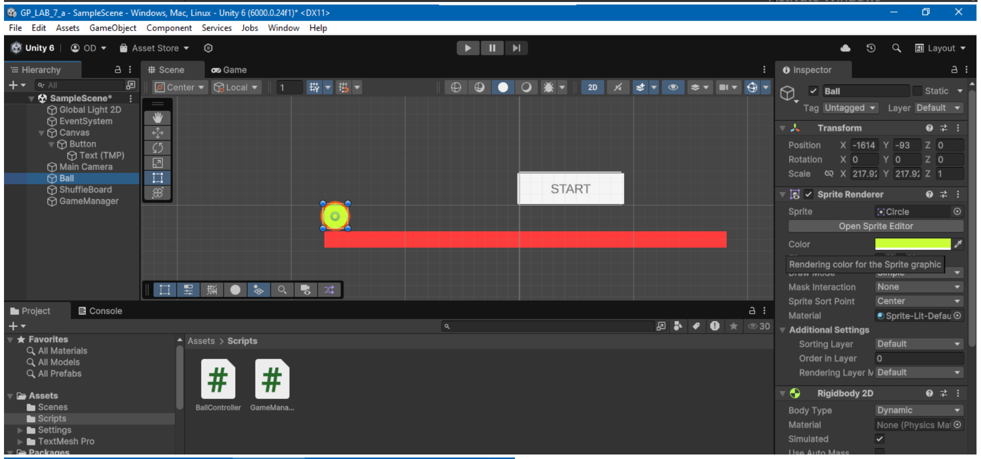
Inspector (Canvas):
Render Mode: Screen Space - Ov
Pixel Perfect
Sort Order: 0
Target Display: Display 1
Additional Shader Ch: Mixed...
Shader channels Normal and Tangent are most often used with lighting, which an Overlay canvas does not support. Its likely these channels are not needed.
Vertex Color Always
Keep vertex color in Gamma space to allow gamma to linear color space conversion to happen in UI shaders. This will enhance UI color precision in linear color space.

Canvas Scaler
UI Scale Mode: Scale With Screen
Reference Resolution: X 800 Y 600
Screen Match Mode: Match Width Or He
Match: 0 (Width Height)
Reference Pixels Per: 100

Graphic Raycaster
Script: GraphicRaycast
Ignore Reversed G...: ✓
Blocking Objects: None
Blocking Mask: Everything

Add Component

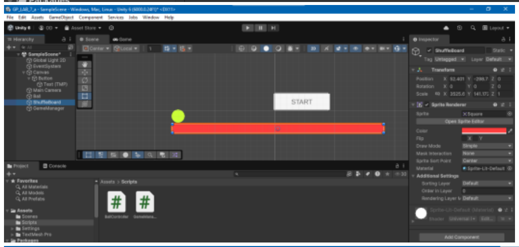
Project: Assets > Scripts: BallController, GameMana...

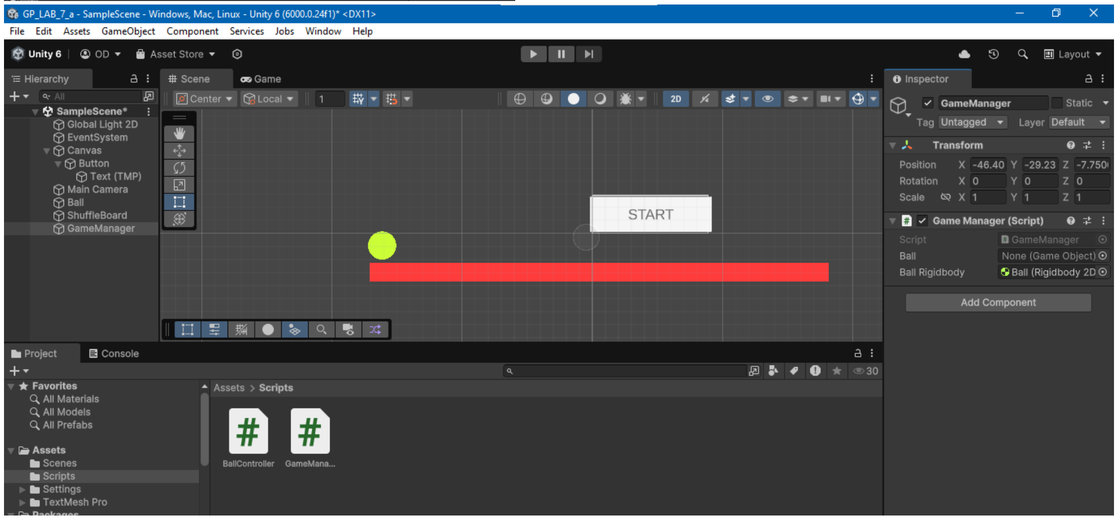

GP_LAB_7_a - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

Inspector (Ball):
Tag: Untagged Layer: Default
Transform
Position: X -1614 Y -93 Z 0
Rotation: X 0 Y 0 Z 0
Scale: X 217.92 Y 217.92 Z 1

Sprite Renderer
Sprite: Circle
Open Sprite Editor
Color
Rendering color for the Sprite graphic
Mask Interaction: None
Sprite Sort Point: Center
Material: Sprite-Lit-Defau
Additional Settings
Sorting Layer: Default
Order in Layer: 0
Rendering Layer M: Default

Rigidbody 2D
Body Type: Dynamic
Material: None (Physics Mat
Simulated: ✓


Inspector (ShuffleBoard): Transform, Sprite Renderer, Sprite: Square


GP_LAB_7_a - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

Inspector (GameManager):
Tag: Untagged Layer: Default
Transform
Position: X -46.40 Y -29.23 Z -7.750
Rotation: X 0 Y 0 Z 0
Scale: X 1 Y 1 Z 1

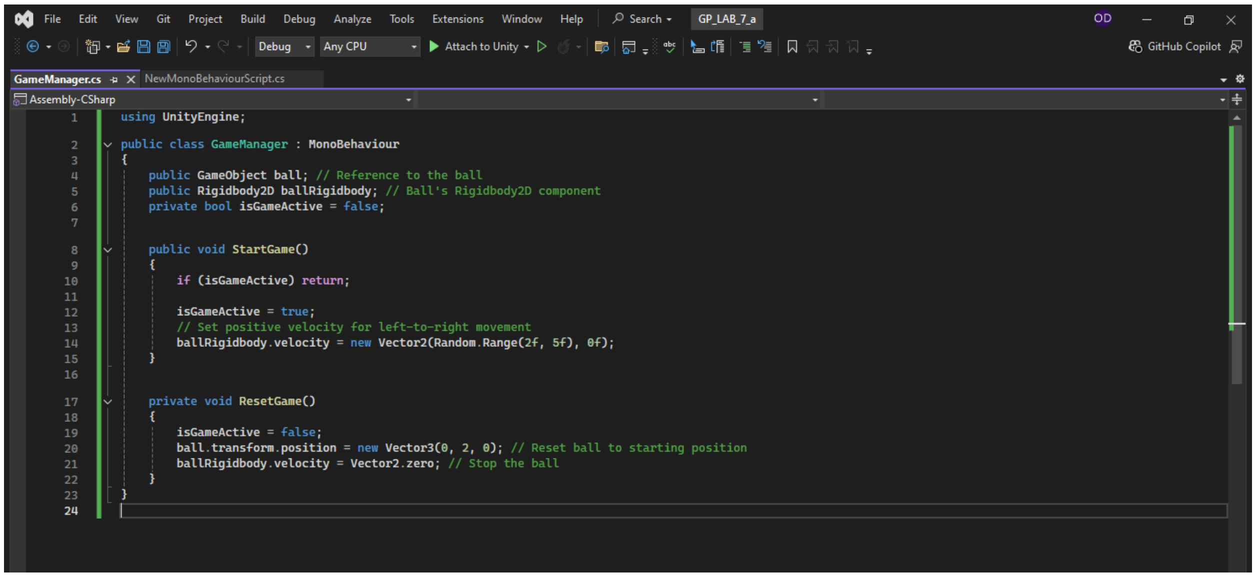
Game Manager (Script)
Script: GameManager
Ball: None (Game Object)
Ball Rigidbody: Ball (Rigidbody 2D)

Add Component

Project: Assets > Scripts: BallController, GameMana...

SCRIPTS:

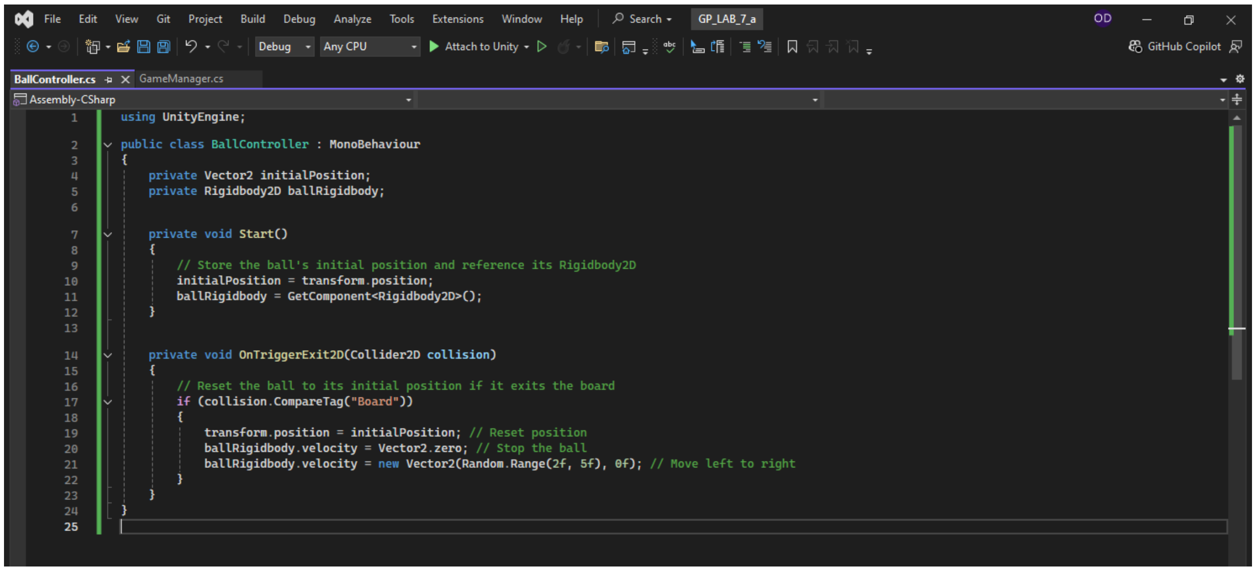
```
using UnityEngine;  #Game Manager Script 1
public class GameManager : MonoBehaviour
{
    public GameObject ball; // Reference to the ball
    public Rigidbody2D ballRigidbody; // Ball's Rigidbody2D 
component
    private bool isGameActive = false;


    public void StartGame()
    {
        if (isGameActive) return;
        isGameActive = true;
        // Set positive velocity for left-to-right movement
        ballRigidbody.linearVelocity = new 
Vector2(Random.Range(2f, 5f), 0f);
    }


    private void ResetGame()
    {
        isGameActive = false;
        ball.transform.position = new Vector3(0, 2, 0); // Reset 
ball to starting position
        ballRigidbody.linearVelocity = Vector2.zero; // Stop the 
ball
    }
}
```



```
using UnityEngine;

public class GameManager : MonoBehaviour
{
    public GameObject ball; // Reference to the ball
    public Rigidbody2D ballRigidbody; // Ball's Rigidbody2D component
    private bool isGameActive = false;


    public void StartGame()
    {
        if (isGameActive) return;

        isGameActive = true;
        // Set positive velocity for left-to-right movement
        ballRigidbody.velocity = new Vector2(Random.Range(2f, 5f), 0f);
    }


    private void ResetGame()
    {
        isGameActive = false;
        ball.transform.position = new Vector3(0, 2, 0); // Reset ball to starting position
        ballRigidbody.velocity = Vector2.zero; // Stop the ball
    }
}

```

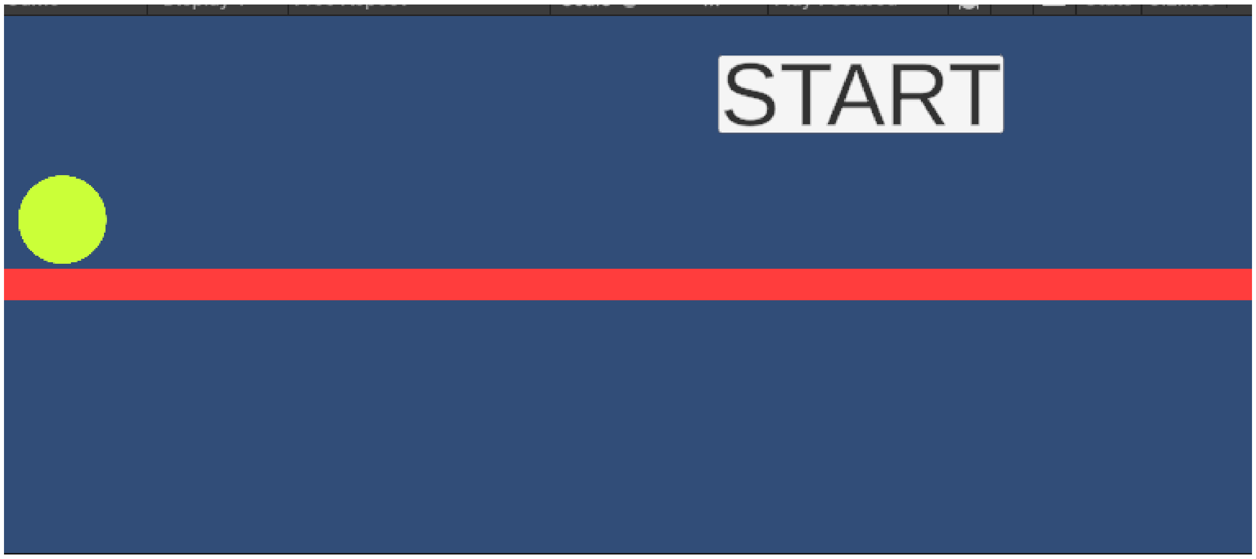
```
using UnityEngine; #Ball Controller Script 2
public class BallController : MonoBehaviour
{
    private Vector2 initialPosition;
    private Rigidbody2D ballRigidbody;

    private void Start()
    {
        // Store the ball's initial position and reference its
Rigidbody2D
        initialPosition = transform.position;
        ballRigidbody = GetComponent<Rigidbody2D>();
    }

    private void OnTriggerExit2D(Collider2D collision)
    {
        // Reset the ball to its initial position if it exits the
board
```

```
        if (collision.CompareTag("Board"))
        {
            transform.position = initialPosition; // Reset
position
            ballRigidbody.velocity = Vector2.zero; // Stop the
ball
            ballRigidbody.velocity = new Vector2(Random.Range(2f,
5f), 0f); // Move left to right
        }
    }
}
```



```
using UnityEngine;

public class BallController : MonoBehaviour
{
    private Vector2 initialPosition;
    private Rigidbody2D ballRigidbody;

    private void Start()
    {
        // Store the ball's initial position and reference its Rigidbody2D
        initialPosition = transform.position;
        ballRigidbody = GetComponent<Rigidbody2D>();
    }

    private void OnTriggerExit2D(Collider2D collision)
    {
        // Reset the ball to its initial position if it exits the board
        if (collision.CompareTag("Board"))
        {
            transform.position = initialPosition; // Reset position
            ballRigidbody.velocity = Vector2.zero; // Stop the ball
            ballRigidbody.velocity = new Vector2(Random.Range(2f, 5f), 0f); // Move left to right
        }
    }
}
```

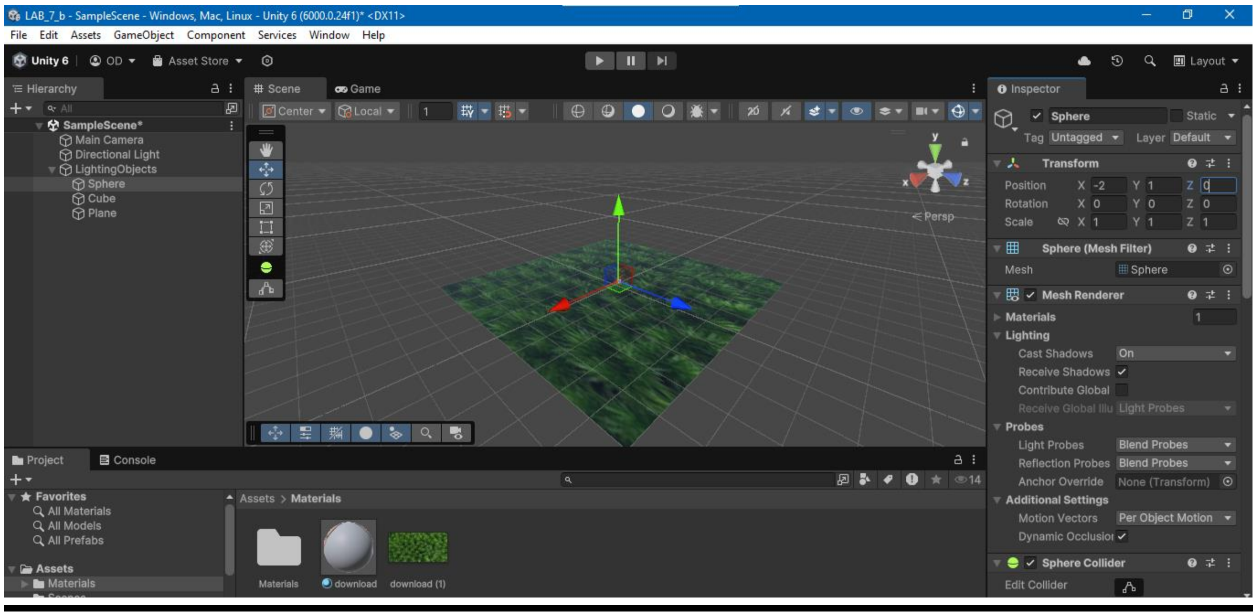
After all necessary setups:



Please refer the video for the gameplay attached in teams.

PHYSICS,LIGHTS AND TEXTURES IN 3D GAME ENVIRONMENT:

Initial setup:



Sphere Static
Tag Untagged Layer Default

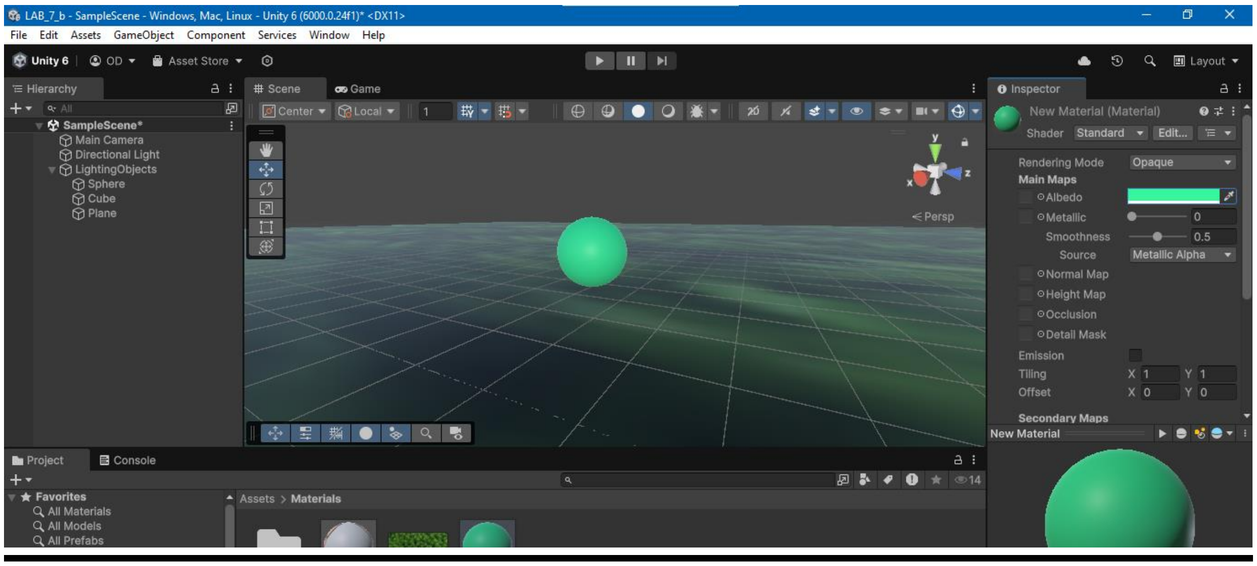
Transform
Position X -2 Y 1 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

Sphere (Mesh Filter)
Mesh Sphere

Mesh Renderer
Materials 1
Lighting
Cast Shadows On
Receive Shadows ✓
Contribute Global
Receive Global Illu Light Probes
Probes
Light Probes Blend Probes
Reflection Probes Blend Probes
Anchor Override None (Transform)
Additional Settings
Motion Vectors Per Object Motion
Dynamic Occlusion ✓

Sphere Collider
Edit Collider

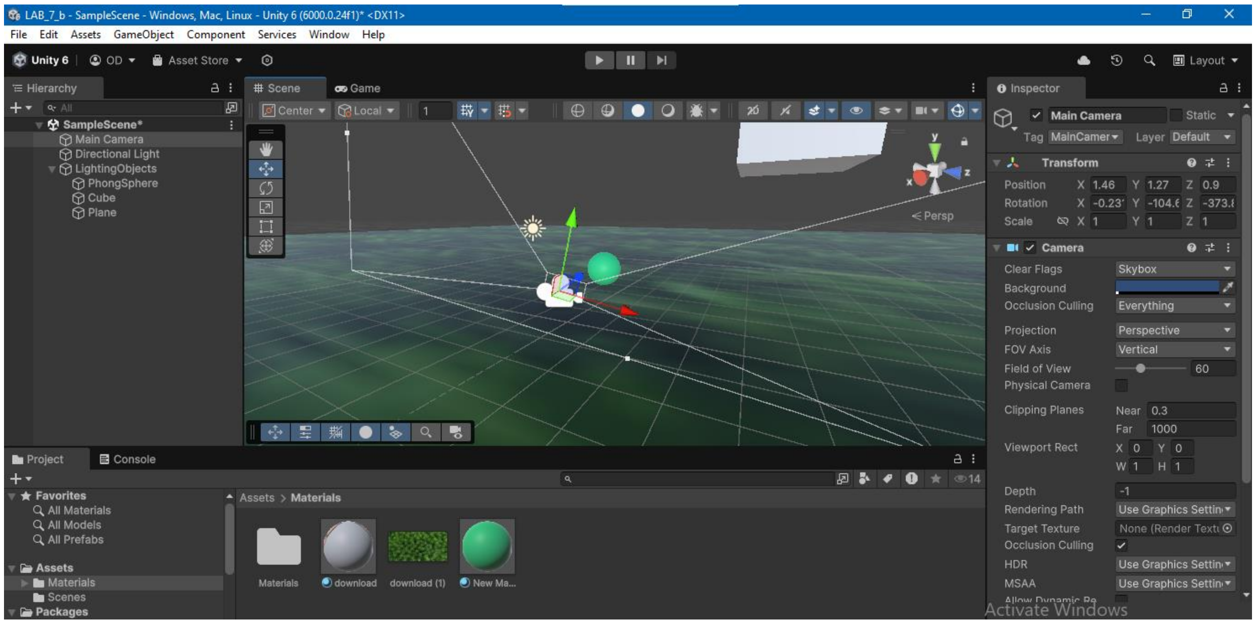
Performing the Phong Lighting for sphere.



New Material (Material)
Shader Standard Edit...

Rendering Mode Opaque
Main Maps
Albedo
Metallic 0
Smoothness 0.5
Source Metallic Alpha
Normal Map
Height Map
Occlusion
Detail Mask
Emission
Tiling X 1 Y 1
Offset X 0 Y 0
Secondary Maps
New Material

<u>Select the shader as standard and specular highlights under materials inspector window for sphere and cube.</u>


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

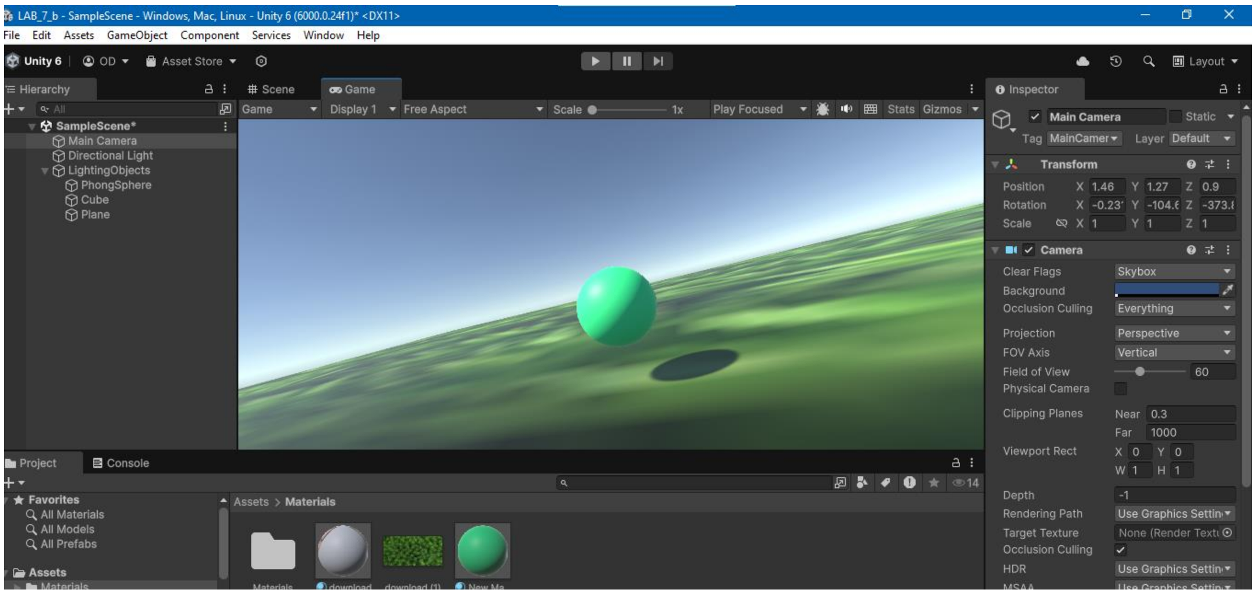
Hierarchy: SampleScene* — Main Camera, Directional Light, LightingObjects (PhongSphere, Cube, Plane)

Assets > Materials: Materials, download, download (1), New Ma...

Inspector: Main Camera — Tag MainCamer — Layer Default

Transform
- Position X 1.46 Y 1.27 Z 0.9
- Rotation X -0.23' Y -104.€ Z -373.ŧ
- Scale X 1 Y 1 Z 1

Camera
- Clear Flags: Skybox
- Background
- Occlusion Culling: Everything
- Projection: Perspective
- FOV Axis: Vertical
- Field of View: 60
- Physical Camera
- Clipping Planes: Near 0.3, Far 1000
- Viewport Rect: X 0 Y 0 W 1 H 1
- Depth: -1
- Rendering Path: Use Graphics Settin
- Target Texture: None (Render Text
- Occlusion Culling: ✓
- HDR: Use Graphics Settin
- MSAA: Use Graphics Settin


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

Game — Display 1 — Free Aspect — Scale 1x — Play Focused — Stats — Gizmos

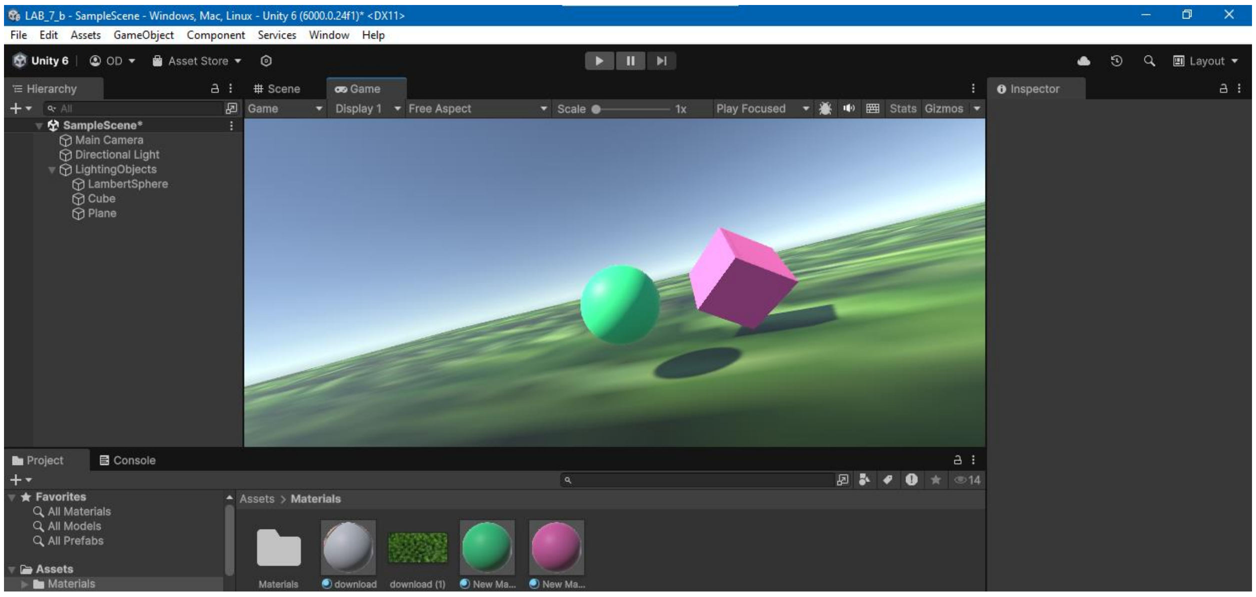
Hierarchy: SampleScene* — Main Camera, Directional Light, LightingObjects (PhongSphere, Cube, Plane)

Assets > Materials

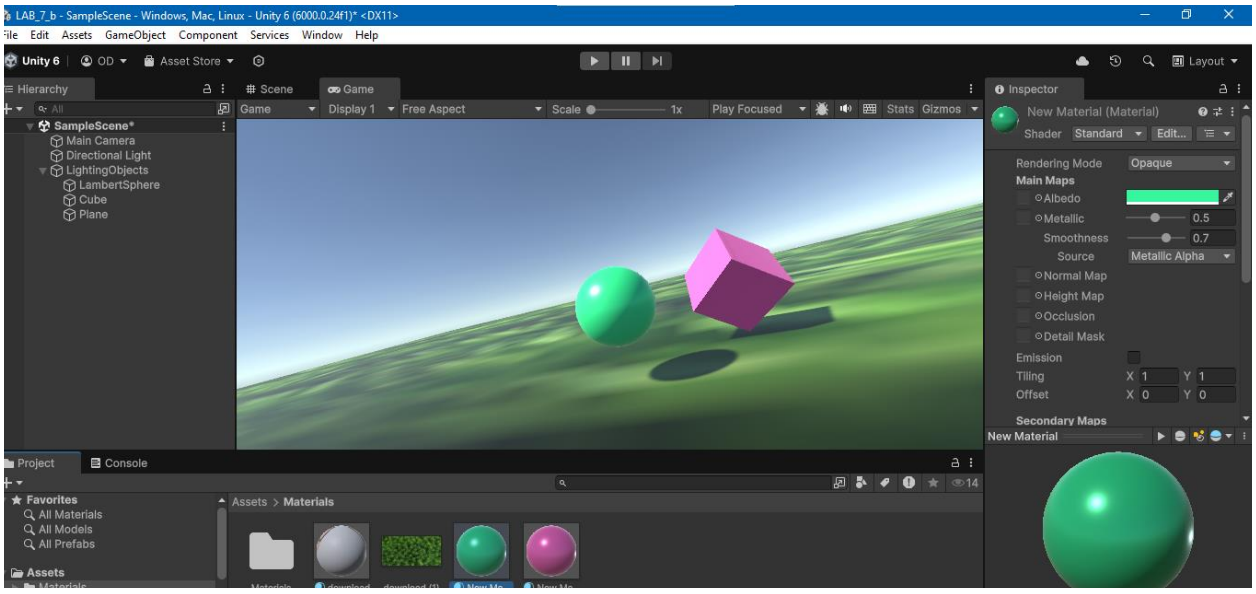
Inspector: Main Camera — Tag MainCamer — Layer Default

Transform
- Position X 1.46 Y 1.27 Z 0.9
- Rotation X -0.23' Y -104.€ Z -373.ŧ
- Scale X 1 Y 1 Z 1

Camera
- Clear Flags: Skybox
- Background
- Occlusion Culling: Everything
- Projection: Perspective
- FOV Axis: Vertical
- Field of View: 60
- Physical Camera
- Clipping Planes: Near 0.3, Far 1000
- Viewport Rect: X 0 Y 0 W 1 H 1
- Depth: -1
- Rendering Path: Use Graphics Settin
- Target Texture: None (Render Text
- Occlusion Culling: ✓
- HDR: Use Graphics Settin

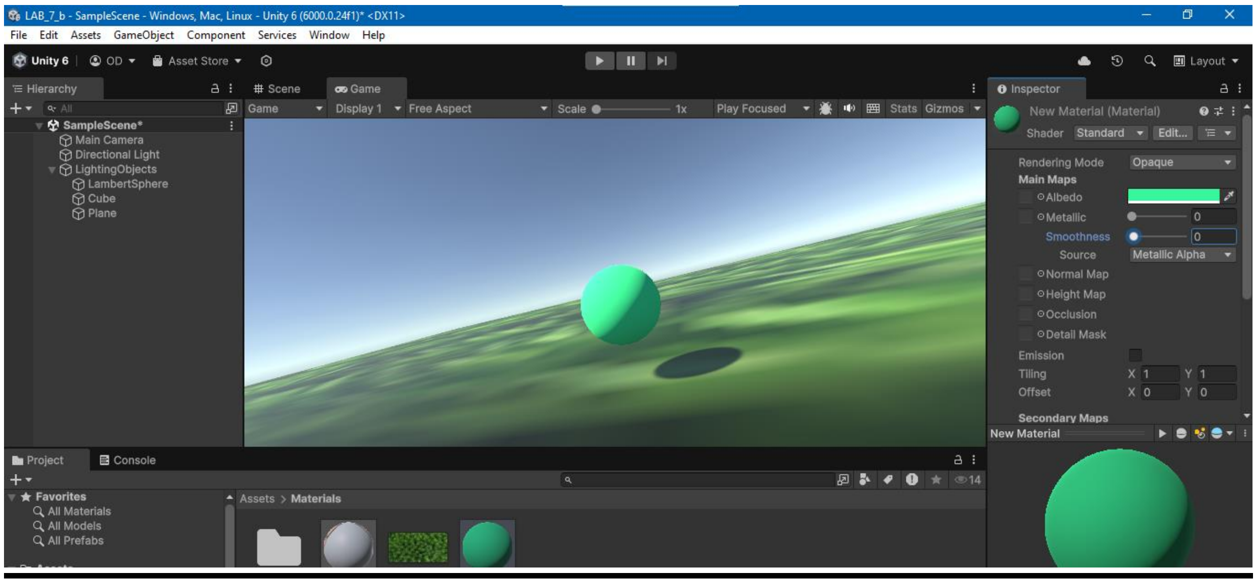

LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

Additional Phong lighting


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

New Material (Material)
Shader Standard
Rendering Mode Opaque
Main Maps
Albedo
Metallic 0.5
Smoothness 0.7
Source Metallic Alpha
Normal Map
Height Map
Occlusion
Detail Mask
Emission
Tiling X 1 Y 1
Offset X 0 Y 0
Secondary Maps

Performing the Lambert Diffuse Lighting Model for Sphere and Cube: (Drag smoothness to 0)



LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

Game | Display 1 | Free Aspect | Scale 1x | Play Focused | Stats | Gizmos

SampleScene*
- Main Camera
- Directional Light
- LightingObjects
  - LambertSphere
  - Cube
  - Plane

New Material (Material)

Shader: Standard

Rendering Mode: Opaque

Main Maps
- Albedo
- Metallic: 0
- Smoothness: 0
- Source: Metallic Alpha
- Normal Map
- Height Map
- Occlusion
- Detail Mask

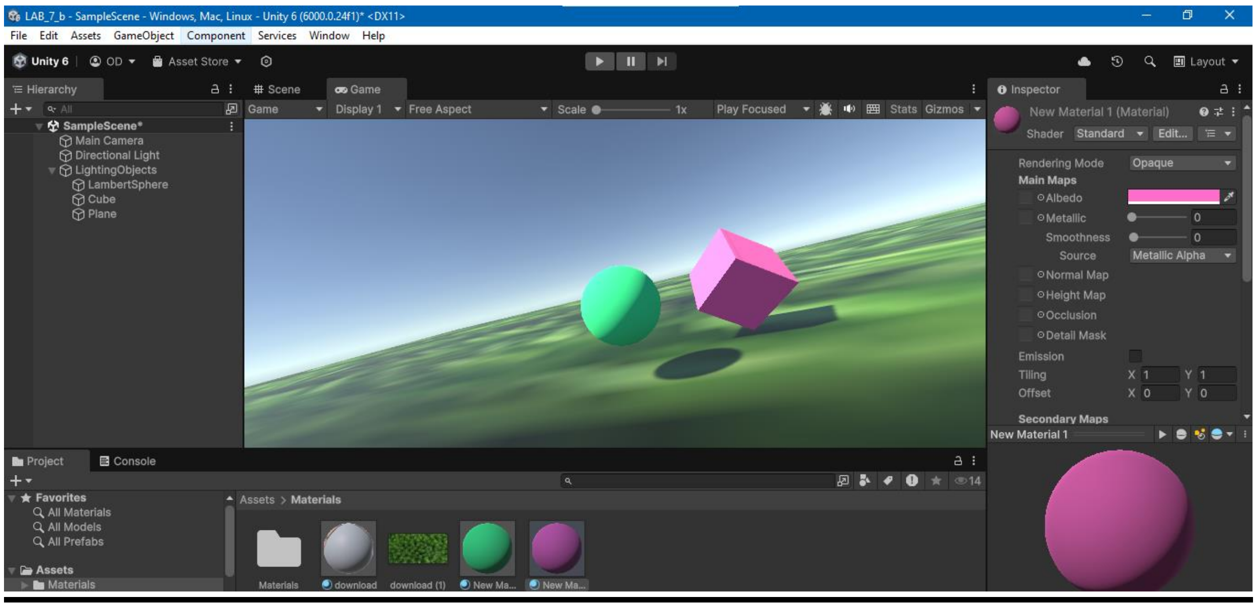
Emission

Tiling: X 1 Y 1

Offset: X 0 Y 0

Secondary Maps

New Material



LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

Game | Display 1 | Free Aspect | Scale 1x | Play Focused | Stats | Gizmos

SampleScene*
- Main Camera
- Directional Light
- LightingObjects
  - LambertSphere
  - Cube
  - Plane

New Material 1 (Material)

Shader: Standard

Rendering Mode: Opaque

Main Maps
- Albedo
- Metallic: 0
- Smoothness: 0
- Source: Metallic Alpha
- Normal Map
- Height Map
- Occlusion
- Detail Mask

Emission

Tiling: X 1 Y 1

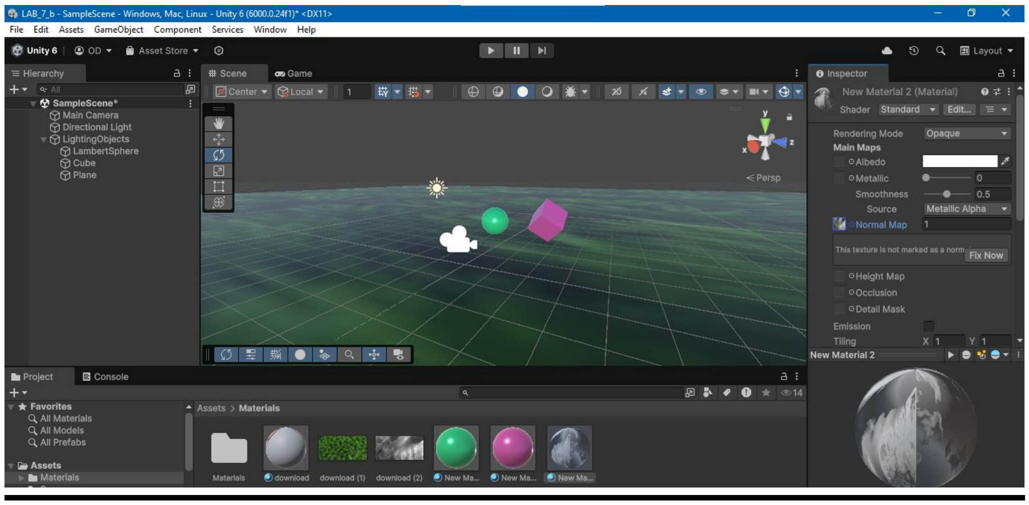
Offset: X 0 Y 0

Secondary Maps

New Material 1

BUMP MAPPING EFFECT:

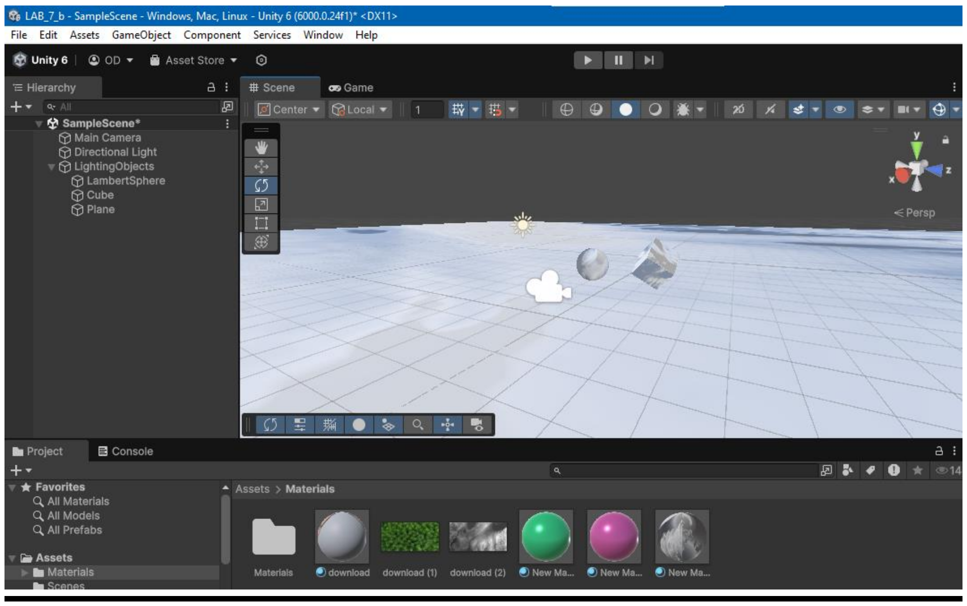
Added Normal Map to Normal Map slot of the material’s inspector and select shader as standard.


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

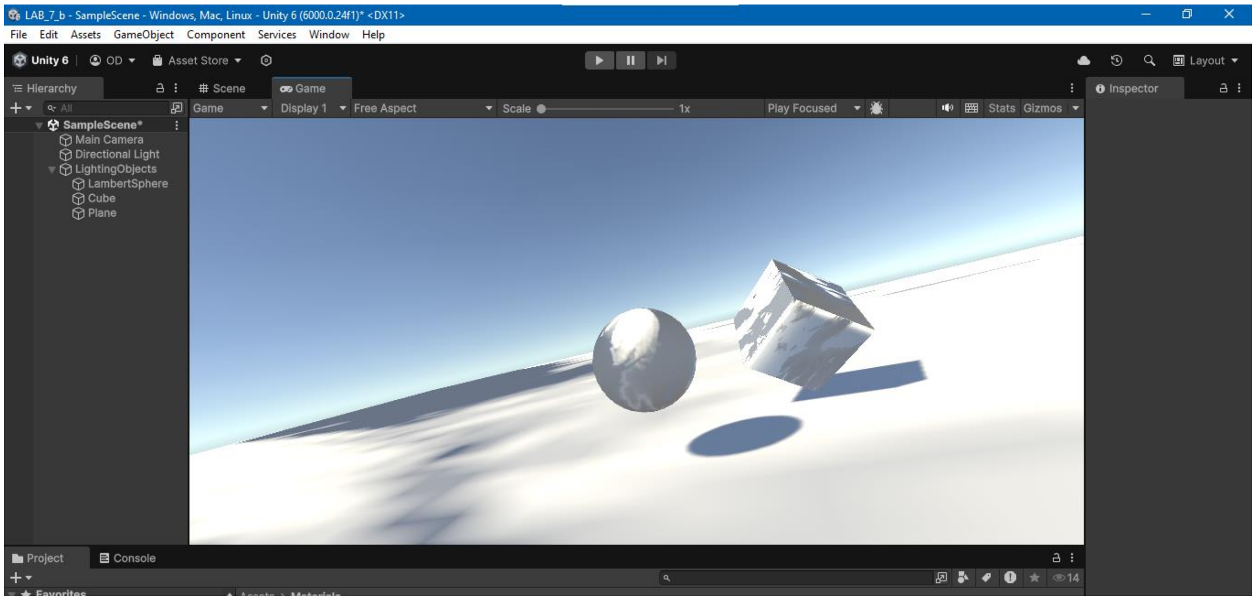
Hierarchy: SampleScene* — Main Camera, Directional Light, LightingObjects (LambertSphere, Cube, Plane)

Inspector: New Material 2 (Material)
Shader: Standard
Rendering Mode: Opaque
Main Maps
Albedo
Metallic: 0
Smoothness: 0.5
Source: Metallic Alpha
Normal Map: 1
This texture is not marked as a norm… Fix Now
Height Map
Occlusion
Detail Mask
Emission
Tiling X 1 Y 1

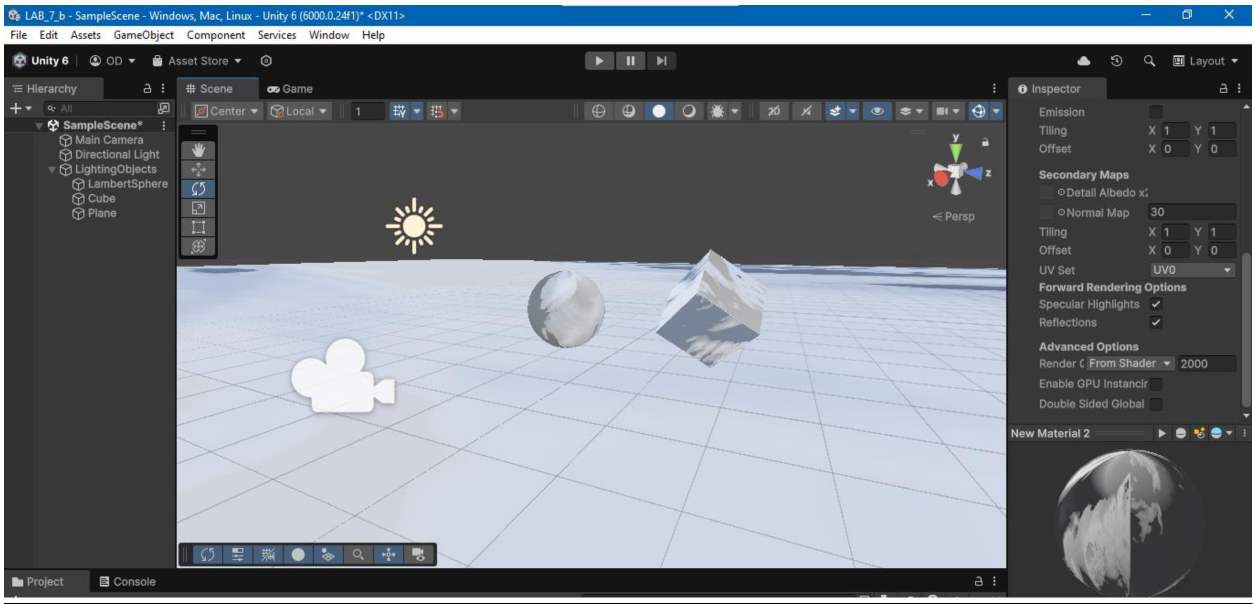
Adding this material texture effect on desired game objects.


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

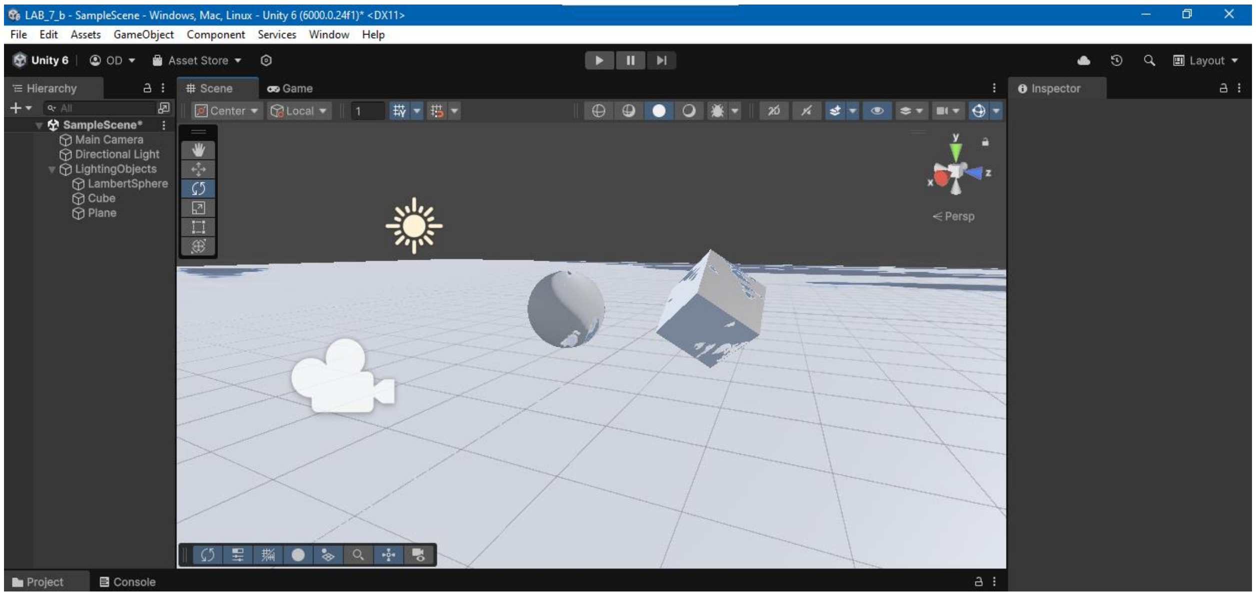
Hierarchy: SampleScene* — Main Camera, Directional Light, LightingObjects (LambertSphere, Cube, Plane)



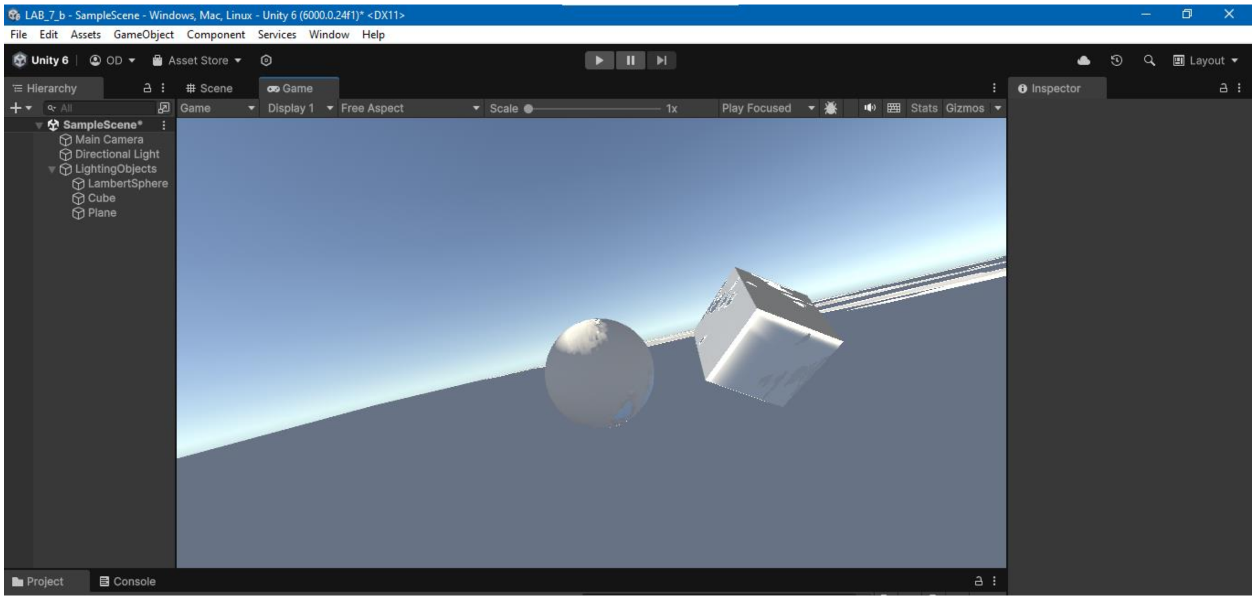
If the intensity is modified (increased)



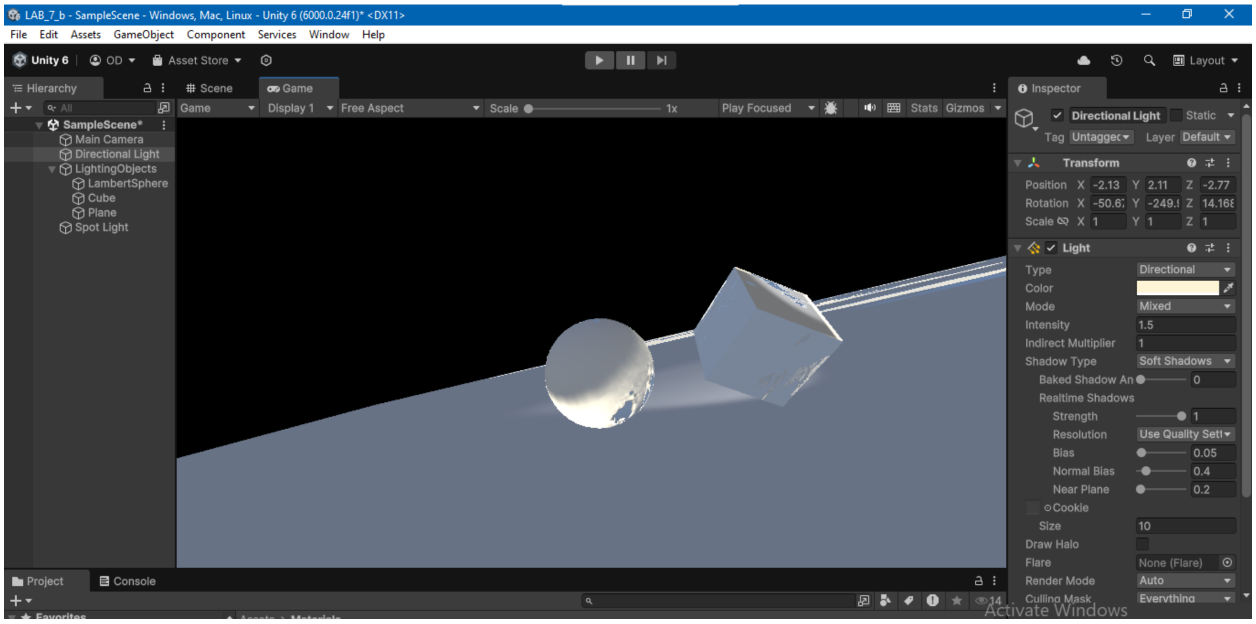
Emission
Tiling X 1 Y 1
Offset X 0 Y 0
Secondary Maps
Detail Albedo x
Normal Map 30
Tiling X 1 Y 1
Offset X 0 Y 0
UV Set UV0
Forward Rendering Options
Specular Highlights ✓
Reflections ✓
Advanced Options
Render Queue From Shader 2000
Enable GPU Instancing
Double Sided Global
New Material 2



Adjust the bumpiness:



Turning directional light to opposite direction and showing effect of spot light on bump effect.


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

SampleScene*
Main Camera
Directional Light
LightingObjects
LambertSphere
Cube
Plane
Spot Light

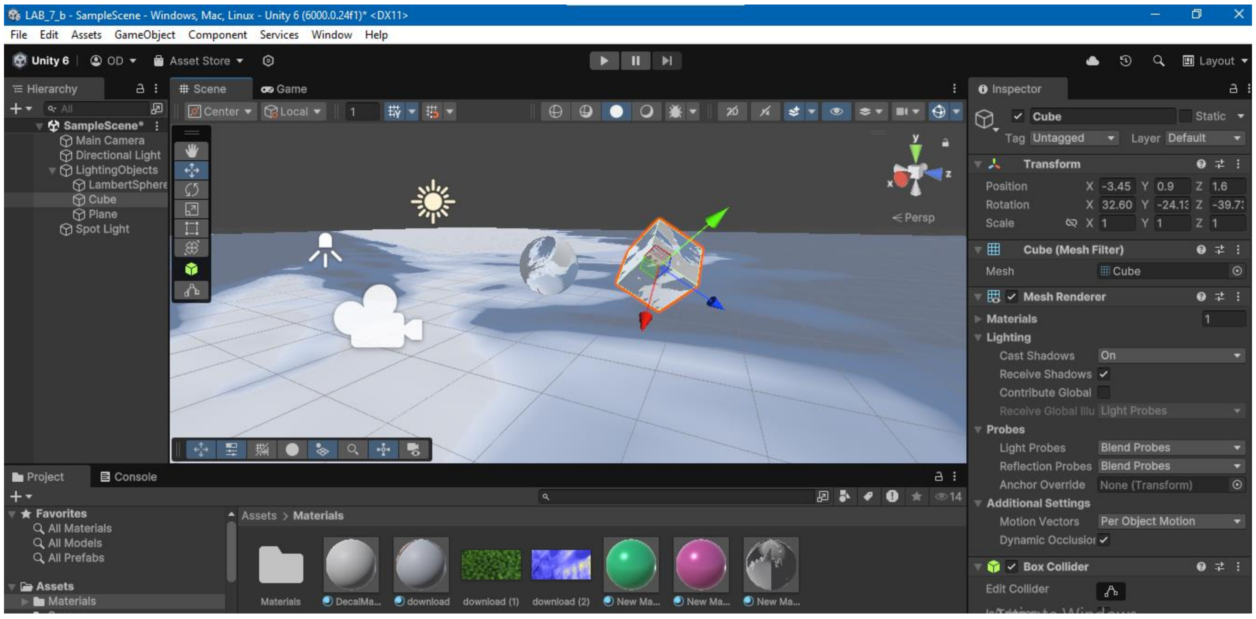
Directional Light
Tag Untagged Layer Default

Transform

	X	Y	Z
Position	-2.13	2.11	-2.77
Rotation	-50.67	-249.9	14.168
Scale	1	1	1

Light

Type	Directional
Mode	Mixed
Intensity	1.5
Indirect Multiplier	1
Shadow Type	Soft Shadows
Baked Shadow An	0
Realtime Shadows	
Strength	1
Resolution	Use Quality Setl
Bias	0.05
Normal Bias	0.4
Near Plane	0.2
Cookie	
Size	10
Draw Halo	
Flare	None (Flare)
Render Mode	Auto
Culling Mask	Everything


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>

SampleScene*
Main Camera
Directional Light
LightingObjects
LambertSphere
Cube
Plane
Spot Light

Cube
Tag Untagged Layer Default

Transform

	X	Y	Z
Position	-3.45	0.9	1.6
Rotation	32.60	-24.13	-39.73
Scale	1	1	1

Cube (Mesh Filter)
Mesh: Cube

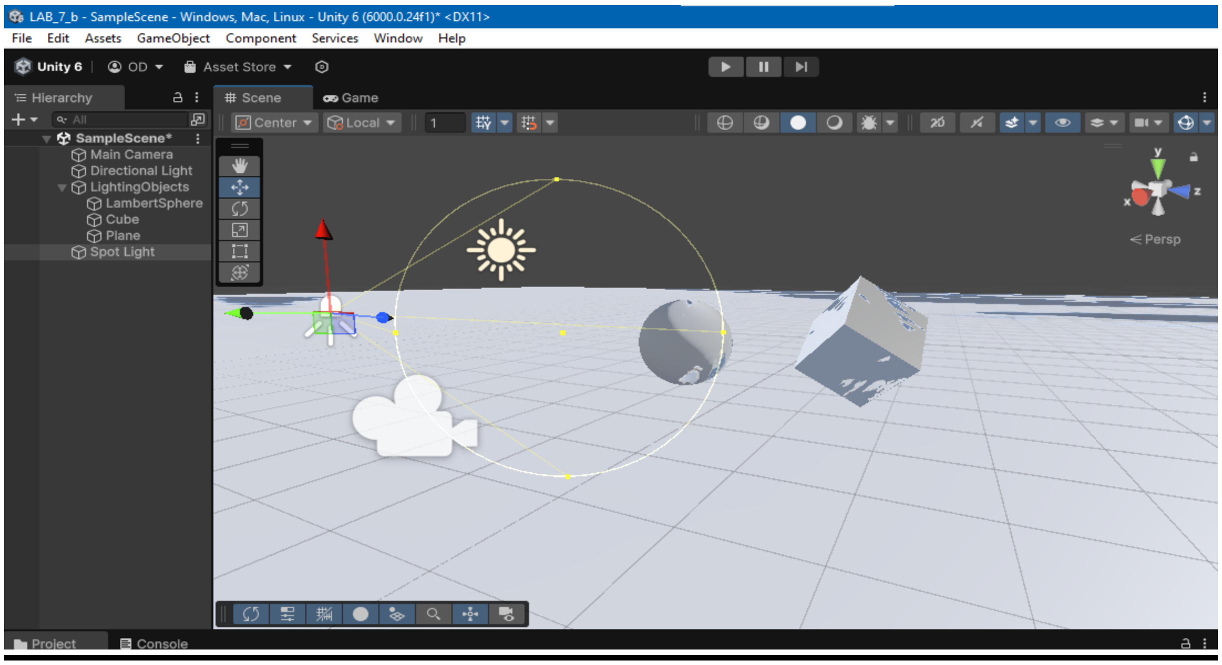
Mesh Renderer

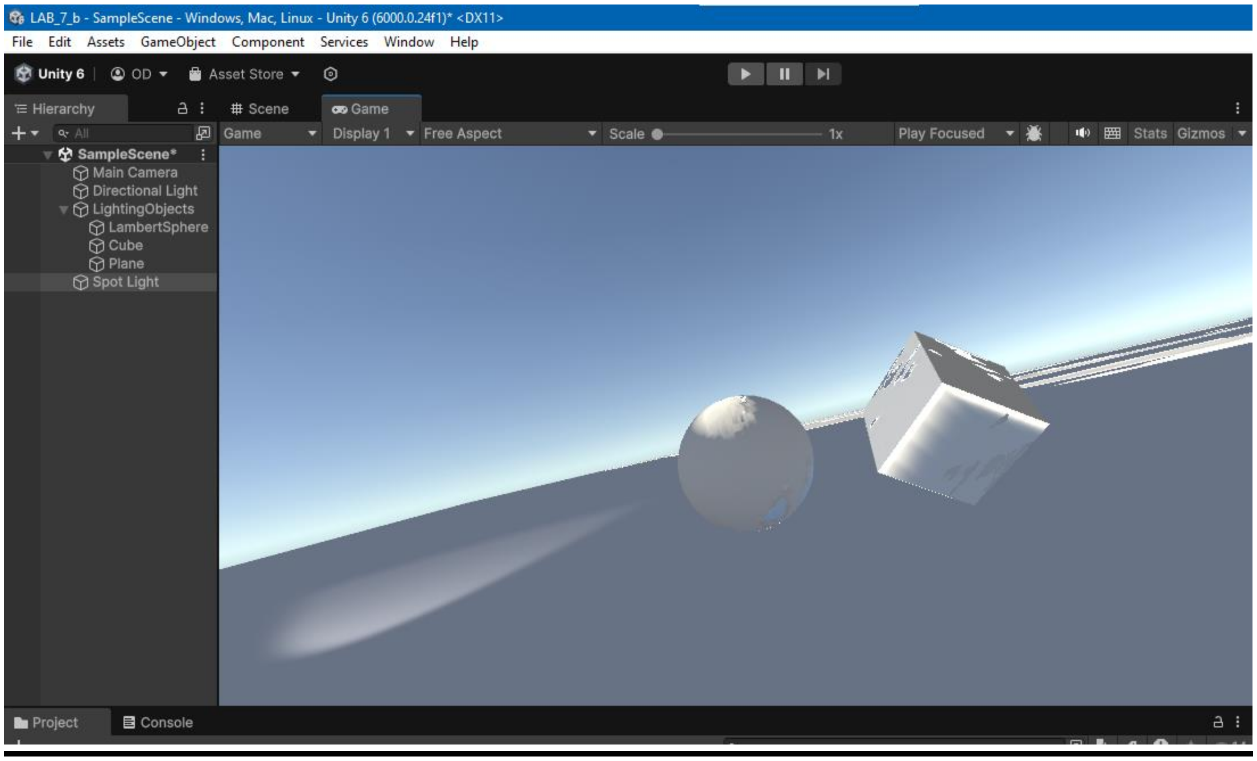
Materials	1
Cast Shadows	On
Receive Shadows	✓
Contribute Global	
Receive Global Illu	Light Probes
Light Probes	Blend Probes
Reflection Probes	Blend Probes
Anchor Override	None (Transform)
Motion Vectors	Per Object Motion
Dynamic Occlusior	✓

Box Collider
Edit Collider

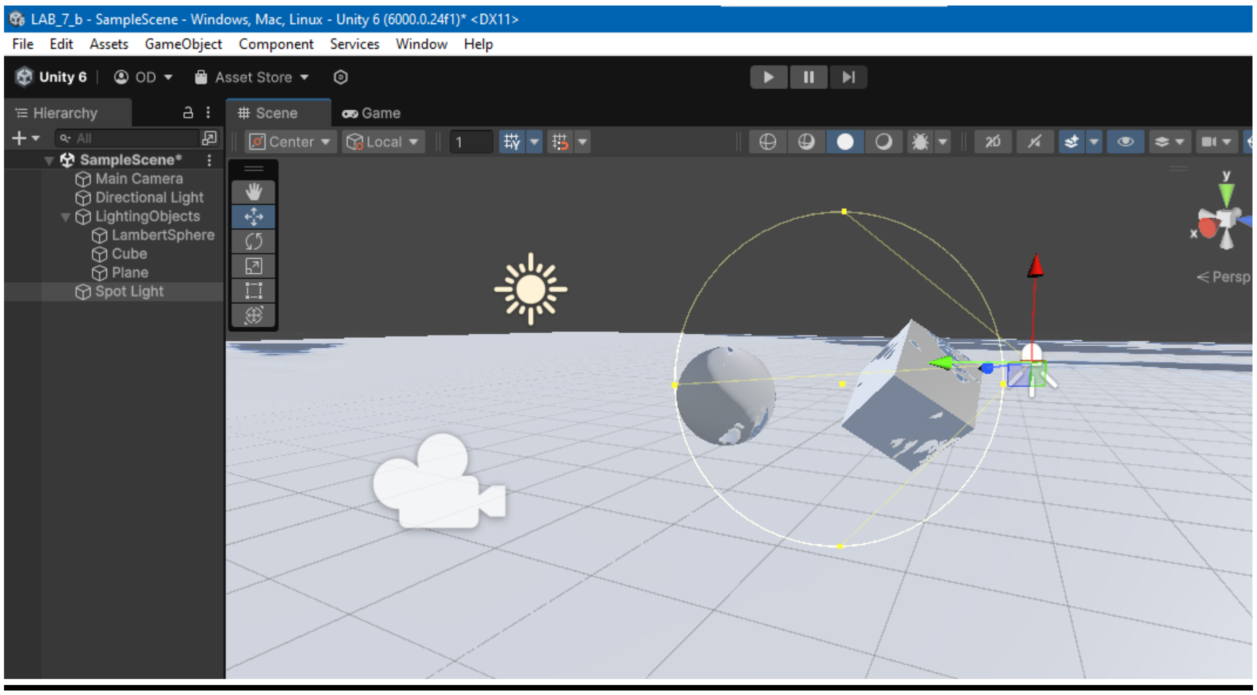
Assets > Materials
Materials, DecalMa..., download, download (1), download (2), New Ma..., New Ma..., New Ma...

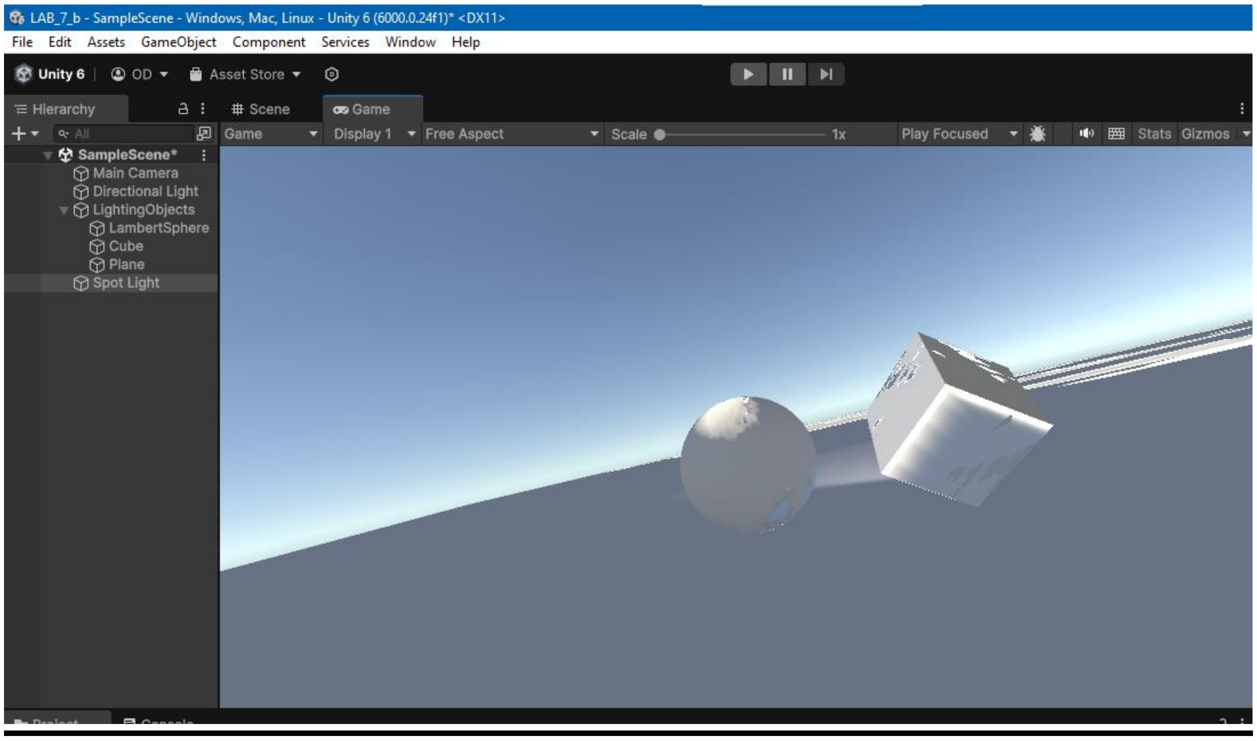
Angle 1:


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>
File Edit Assets GameObject Component Services Window Help
Unity 6 OD Asset Store
Hierarchy
Scene
Game
Center
Local
SampleScene*
Main Camera
Directional Light
LightingObjects
LambertSphere
Cube
Plane
Spot Light
Persp
Project
Console


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>
File Edit Assets GameObject Component Services Window Help
Unity 6 OD Asset Store
Hierarchy
Scene
Game
Game
Display 1
Free Aspect
Scale
1x
Play Focused
Stats
Gizmos
SampleScene*
Main Camera
Directional Light
LightingObjects
LambertSphere
Cube
Plane
Spot Light
Project
Console

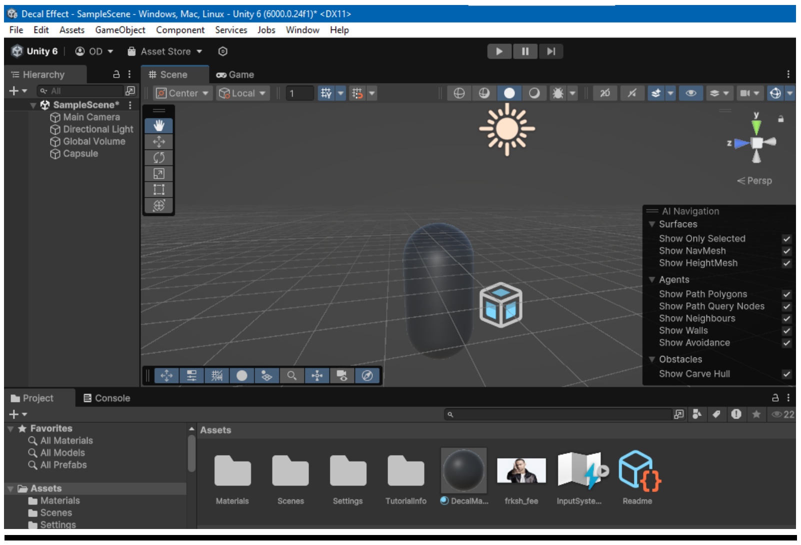
Angle 2:


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>
File Edit Assets GameObject Component Services Window Help
Unity 6
OD
Asset Store
Hierarchy
Scene
Game
Center
Local
SampleScene*
Main Camera
Directional Light
LightingObjects
LambertSphere
Cube
Plane
Spot Light
Persp


LAB_7_b - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>
File Edit Assets GameObject Component Services Window Help
Unity 6
OD
Asset Store
Hierarchy
Scene
Game
Game
Display 1
Free Aspect
Scale
1x
Play Focused
Stats
Gizmos
SampleScene*
Main Camera
Directional Light
LightingObjects
LambertSphere
Cube
Plane
Spot Light

DECAL EFFECTS:

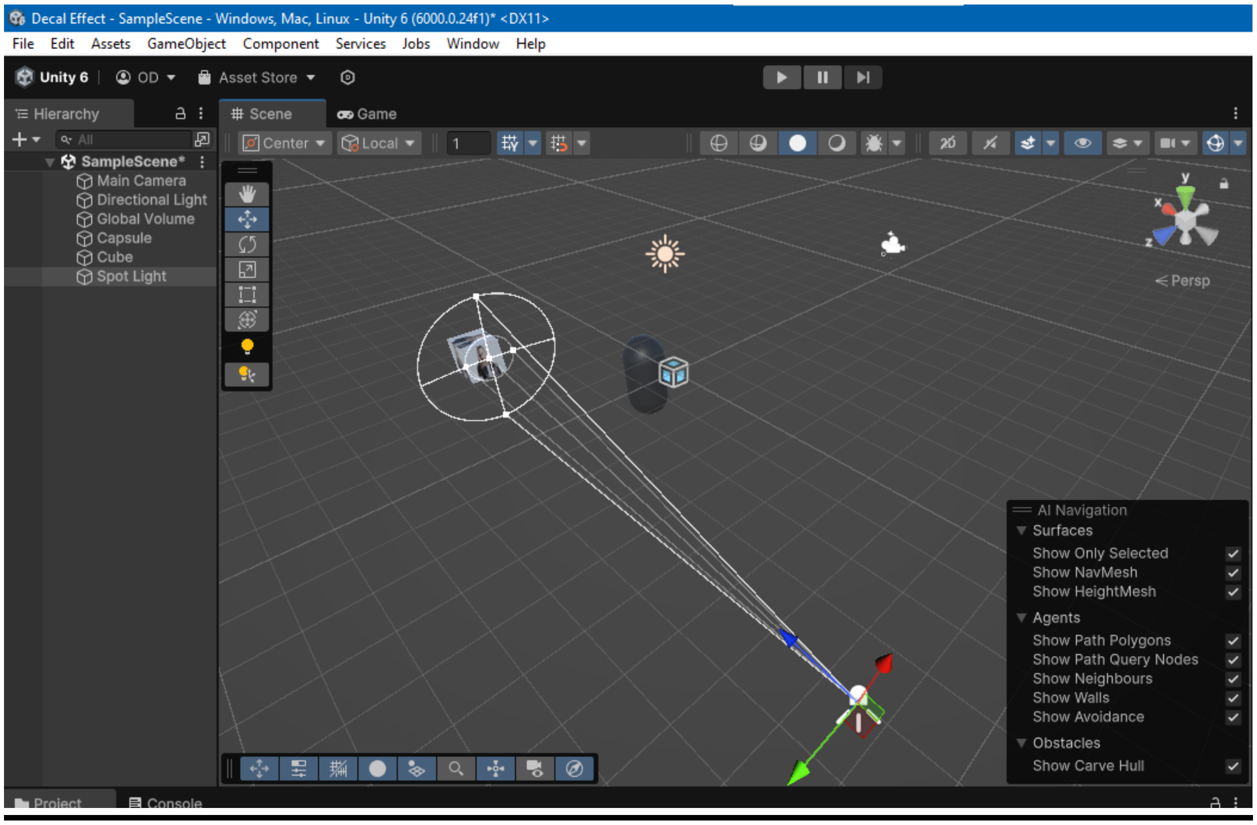
For this effect to be applied, we need a separately URP environment created.



AI Navigation
Surfaces
- Show Only Selected ✓
- Show NavMesh ✓
- Show HeightMesh ✓

Agents
- Show Path Polygons ✓
- Show Path Query Nodes ✓
- Show Neighbours ✓
- Show Walls ✓
- Show Avoidance ✓

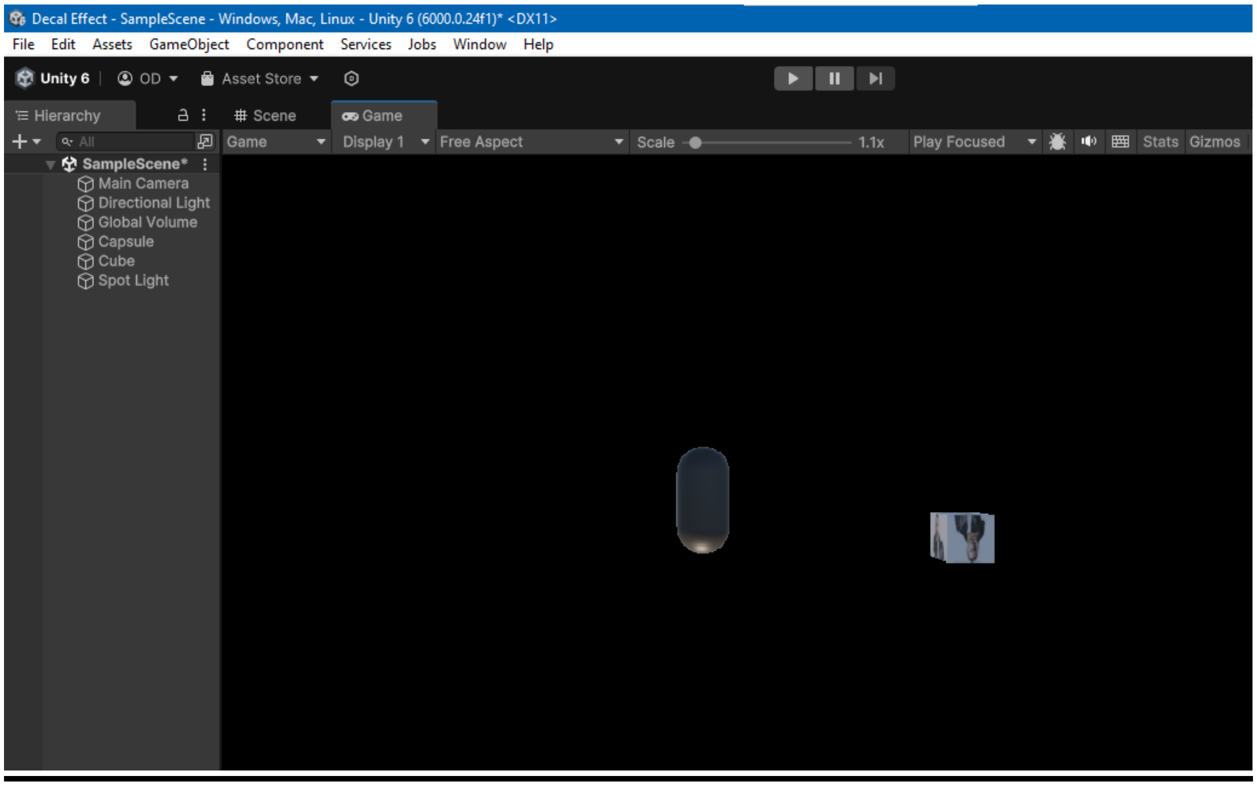
Obstacles
- Show Carve Hull ✓

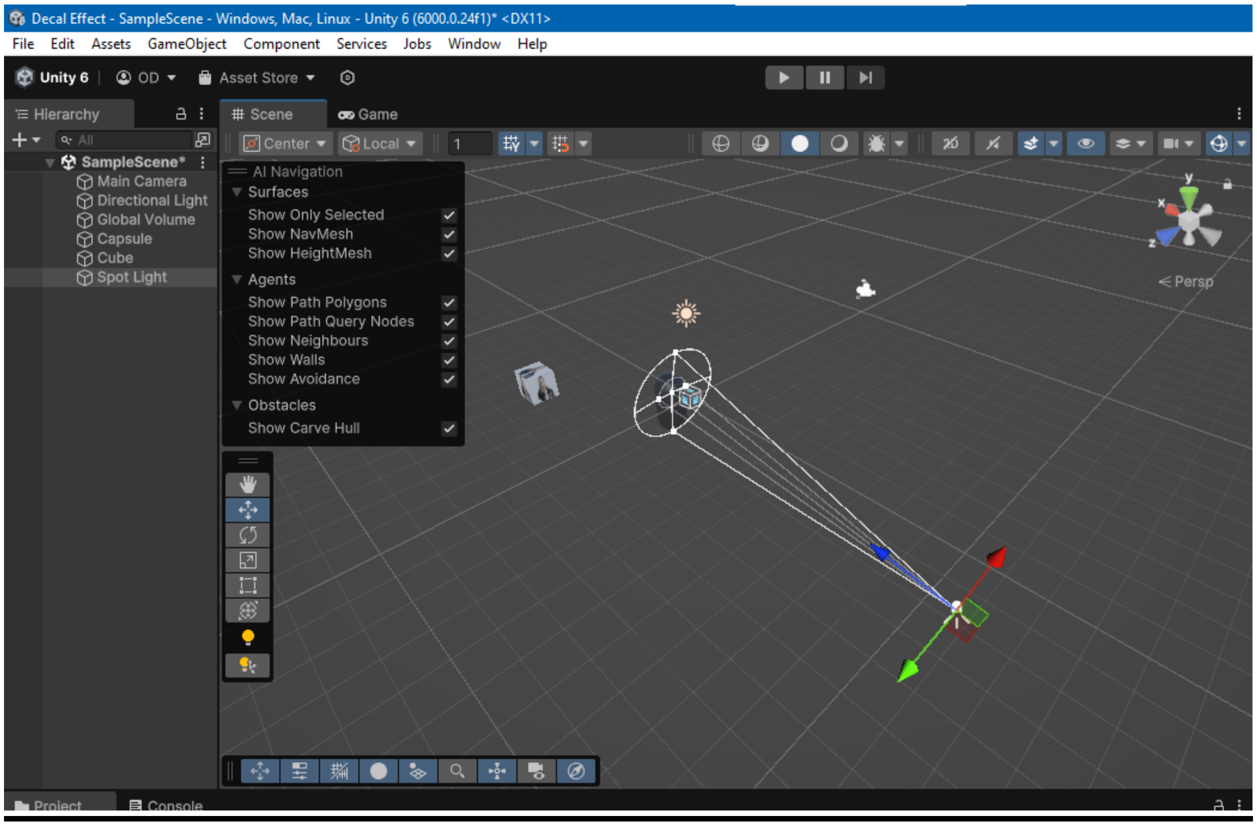

Decal Effect - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>
File Edit Assets GameObject Component Services Jobs Window Help
Unity 6
OD
Asset Store
Hierarchy
Scene
Game
Center
Local
SampleScene*
Main Camera
Directional Light
Global Volume
Capsule
Cube
Spot Light
Persp
Project
Console

AI Navigation
Surfaces
- Show Only Selected ✓
- Show NavMesh ✓
- Show HeightMesh ✓

Agents
- Show Path Polygons ✓
- Show Path Query Nodes ✓
- Show Neighbours ✓
- Show Walls ✓
- Show Avoidance ✓

Obstacles
- Show Carve Hull ✓


Decal Effect - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>
File Edit Assets GameObject Component Services Jobs Window Help
Unity 6
OD
Asset Store
Hierarchy
Scene
Game
Game
Display 1
Free Aspect
Scale
1.1x
Play Focused
Stats
Gizmos
SampleScene*
Main Camera
Directional Light
Global Volume
Capsule
Cube
Spot Light


Decal Effect - SampleScene - Windows, Mac, Linux - Unity 6 (6000.0.24f1)* <DX11>
File Edit Assets GameObject Component Services Jobs Window Help
Unity 6
OD
Asset Store
Hierarchy
Scene
Game
Center
Local
1
SampleScene*
Main Camera
Directional Light
Global Volume
Capsule
Cube
Spot Light
AI Navigation
Surfaces
Show Only Selected ✓
Show NavMesh ✓
Show HeightMesh ✓
Agents
Show Path Polygons ✓
Show Path Query Nodes ✓
Show Neighbours ✓
Show Walls ✓
Show Avoidance ✓
Obstacles
Show Carve Hull ✓
< Persp
Project
Console