UNIVERSITI TEKNOLOGI PETRONAS

COURSE NAME: OBJECT ORIENTED PROGRAMMING

COURSE CODE: TFB1033

LECTURER NAME: DR. NORDIN ZAKARIA

GROUP NAME: SPACE MAVERICKS

NO	NAME	STUDENT ID	COURSE
1.	NUR AISYAH AIDA BINTI JAAFAR (GROUP LEADER)	22010178	INFORMATION TECHNOLOGY
2.	AKMAL BIN AHMAD AZRUL NIZAM	22010189	INFORMATION TECHNOLOGY
3.	SITI NORLEITEY MARSYA MAISARA BINTI ZAINUDDIN	22010120	INFORMATION TECHNOLOGY
4.	NURUL FATIN NAQILA BINTI ABDULLAH	22010311	INFORMATION TECHNOLOGY
5.	NUR ZALIKHA IZZATI BINTI GHAZALI	22010082	INFORMATION TECHNOLOGY
6.	THARSINAA A/P GUNALAN	22010151	INFORMATION TECHNOLOGY

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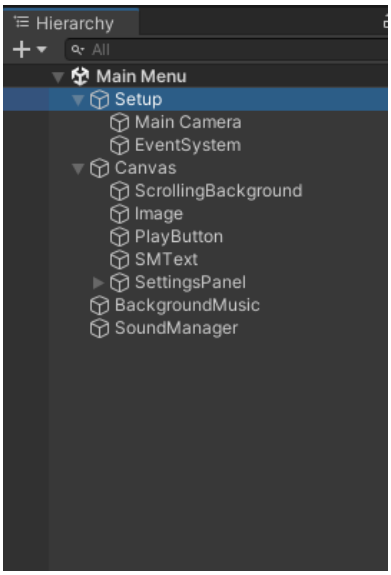
1.0 PROJECT DESCRIPTION

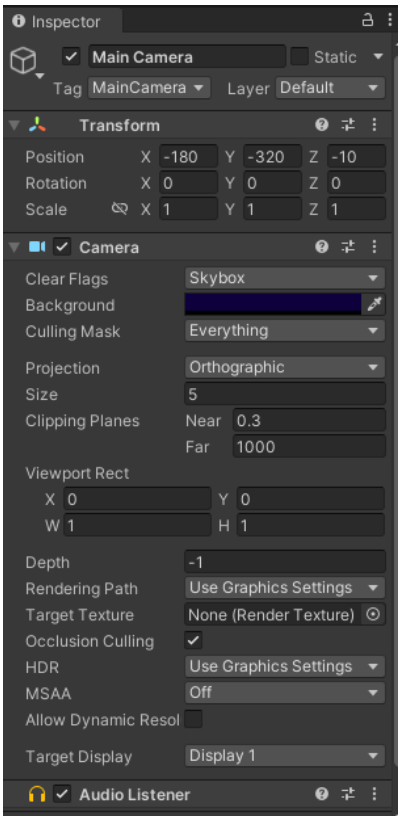
In Swarm Maverick, players control a spaceship and defend against endless waves of alien invaders in space. In this game, players control a spaceship that continuously moves forward, demanding that they navigate and avoid a relentless barrage of obstacles and enemies. This shift from level-based gameplay to an infinite survival challenge introduces a new layer of excitement and unpredictability.

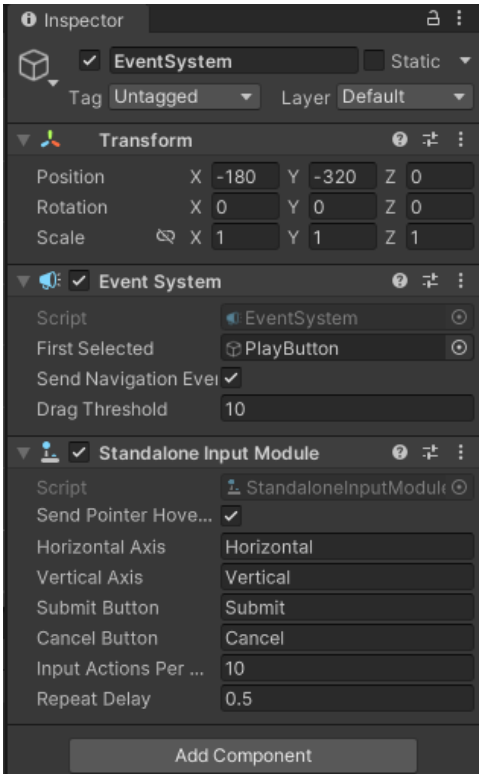
The game features fast-paced action, power-up.The game's automatic movement mechanic simplifies controls, allowing players to focus solely on manoeuvring their Spaceship to avoid hazards and strategically using temporary power-ups.

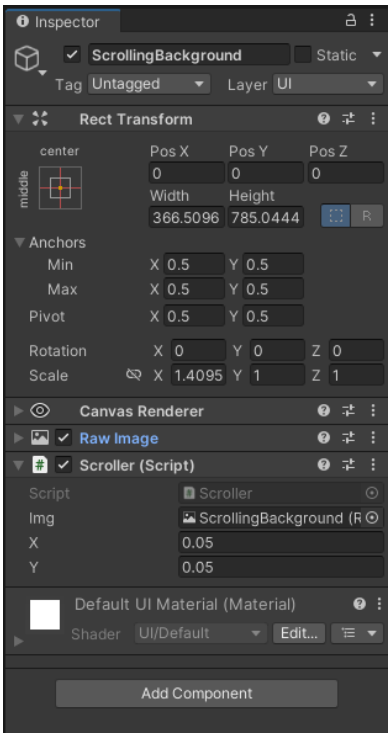
2.0 SCREENSHOTS

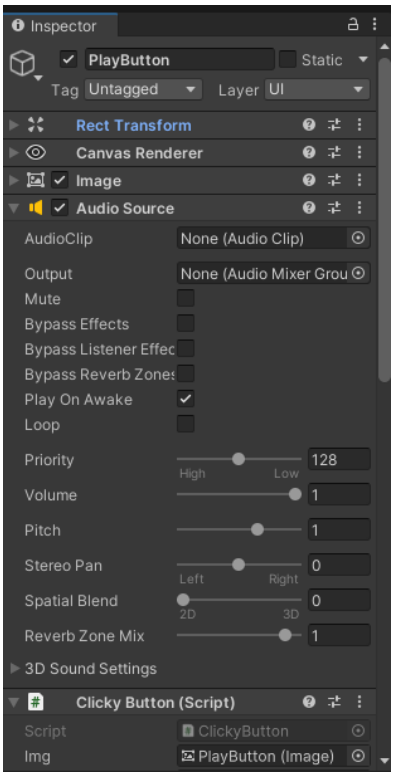
2.1 Main Menu

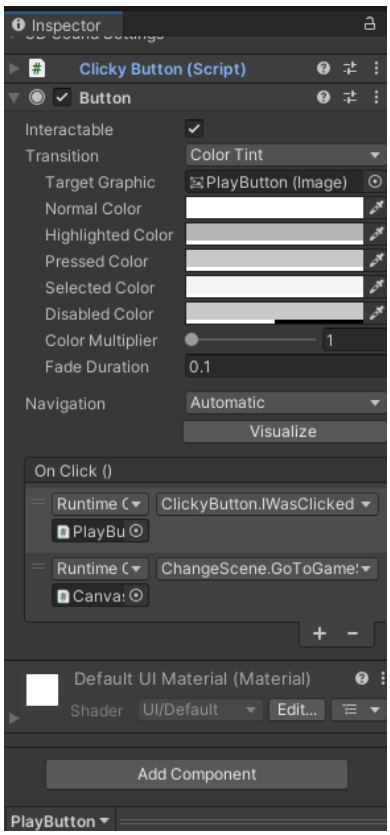


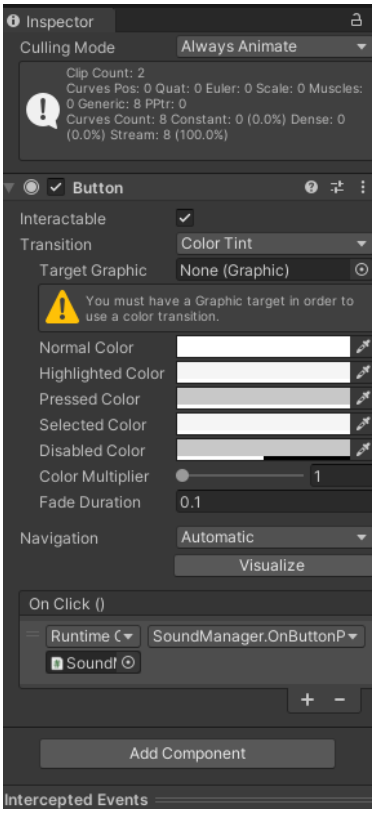


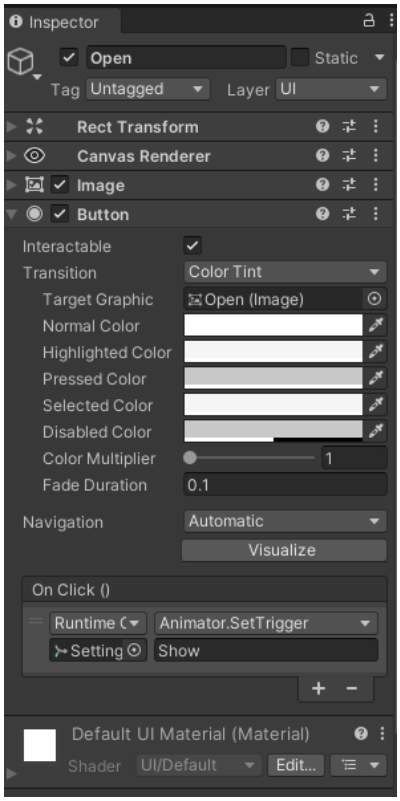


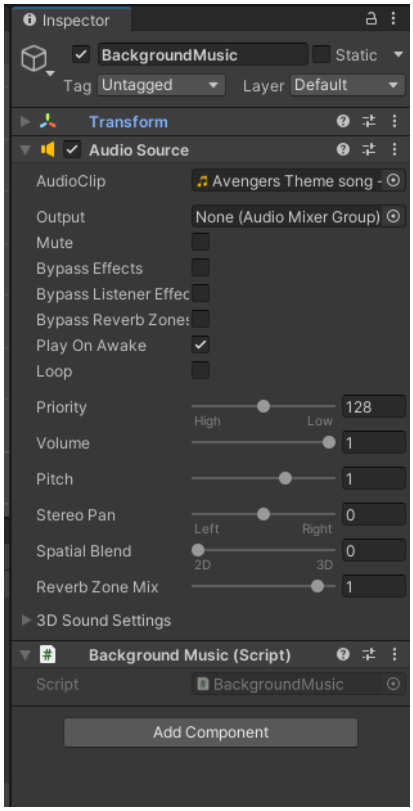

Inspector
ScrollingBackground
Static
Tag Untagged
Layer UI
Rect Transform
center
middle
Pos X 0
Pos Y 0
Pos Z 0
Width 366.5096
Height 785.0444
Anchors
Min X 0.5 Y 0.5
Max X 0.5 Y 0.5
Pivot X 0.5 Y 0.5
Rotation X 0 Y 0 Z 0
Scale X 1.4095 Y 1 Z 1
Canvas Renderer
Raw Image
Scroller (Script)
Script Scroller
Img ScrollingBackground (R
X 0.05
Y 0.05
Default UI Material (Material)
Shader UI/Default
Edit...
Add Component

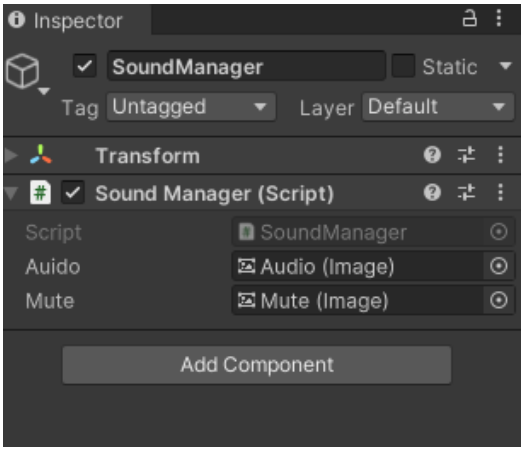

Inspector
PlayButton
Static
Tag Untagged
Layer UI
Rect Transform
Canvas Renderer
Image
Audio Source
AudioClip None (Audio Clip)
Output None (Audio Mixer Grou
Mute
Bypass Effects
Bypass Listener Effec
Bypass Reverb Zones
Play On Awake
Loop
Priority 128
High Low
Volume 1
Pitch 1
Stereo Pan 0
Left Right
Spatial Blend 0
2D 3D
Reverb Zone Mix 1
3D Sound Settings
Clicky Button (Script)
Script ClickyButton
Img PlayButton (Image)

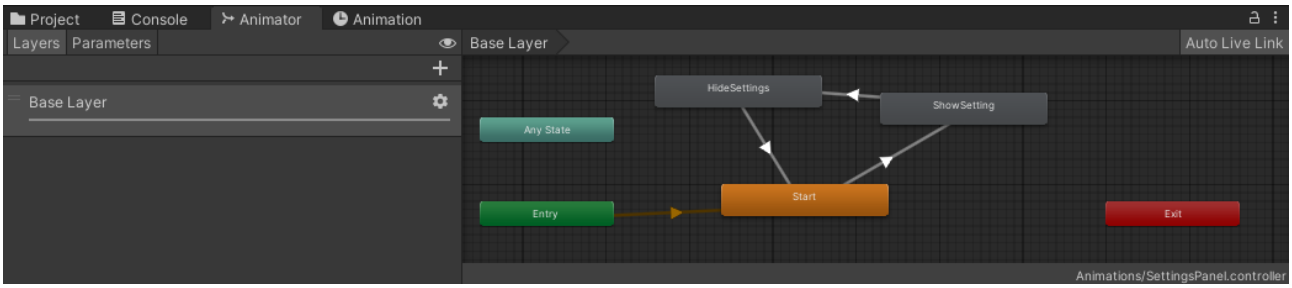

Inspector
Clicky Button (Script)
Button
Interactable
Transition Color Tint
Target Graphic PlayButton (Image)
Normal Color
Highlighted Color
Pressed Color
Selected Color
Disabled Color
Color Multiplier 1
Fade Duration 0.1
Navigation Automatic
Visualize
On Click ()
Runtime
ClickyButton.IWasClicked
PlayBu
Runtime
ChangeScene.GoToGame!
Canva:
Default UI Material (Material)
Shader UI/Default
Edit...
Add Component
PlayButton


Inspector
Culling Mode Always Animate
Clip Count: 2
Curves Pos: 0 Quat: 0 Euler: 0 Scale: 0 Muscles: 0 Generic: 8 PPtr: 0
Curves Count: 8 Constant: 0 (0.0%) Dense: 0 (0.0%) Stream: 8 (100.0%)
Button
Interactable
Transition Color Tint
Target Graphic None (Graphic)
You must have a Graphic target in order to use a color transition.
Normal Color
Highlighted Color
Pressed Color
Selected Color
Disabled Color
Color Multiplier 1
Fade Duration 0.1
Navigation Automatic
Visualize
On Click ()
Runtime
SoundManager.OnButtonP
Sound
Add Component
Intercepted Events


Inspector
Open
Static
Tag Untagged
Layer UI
Rect Transform
Canvas Renderer
Image
Button
Interactable
Transition Color Tint
Target Graphic Open (Image)
Normal Color
Highlighted Color
Pressed Color
Selected Color
Disabled Color
Color Multiplier 1
Fade Duration 0.1
Navigation Automatic
Visualize
On Click ()
Runtime
Animator.SetTrigger
Setting
Show
Default UI Material (Material)
Shader UI/Default
Edit...


Inspector
BackgroundMusic
Static
Tag Untagged
Layer Default
Transform
Audio Source
AudioClip Avengers Theme song -
Output None (Audio Mixer Group)
Mute
Bypass Effects
Bypass Listener Effec
Bypass Reverb Zones
Play On Awake
Loop
Priority 128
High Low
Volume 1
Pitch 1
Stereo Pan 0
Left Right
Spatial Blend 0
2D 3D
Reverb Zone Mix 1
3D Sound Settings
Background Music (Script)
Script BackgroundMusic
Add Component

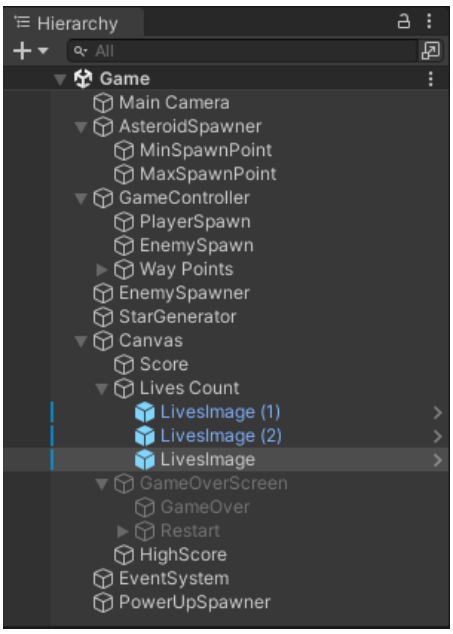

Inspector
SoundManager
Static
Tag
Untagged
Layer
Default
Transform
Sound Manager (Script)
Script
SoundManager
Auido
Audio (Image)
Mute
Mute (Image)
Add Component

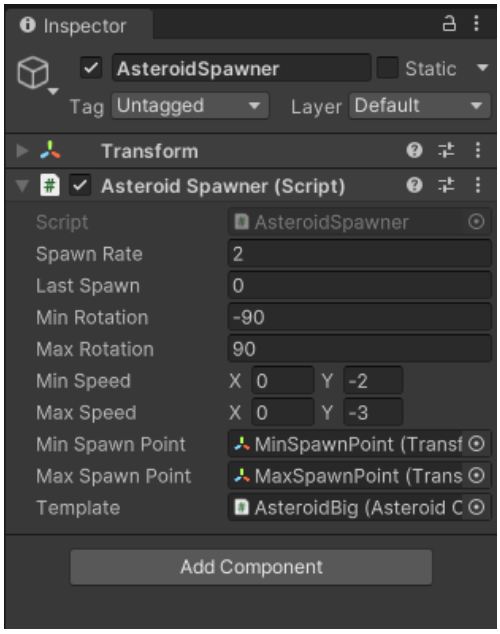

Project
Console
Animator
Animation
Layers
Parameters
Base Layer
Auto Live Link
Base Layer
HideSettings
ShowSetting
Any State
Start
Entry
Exit
Animations/SettingsPanel.controller

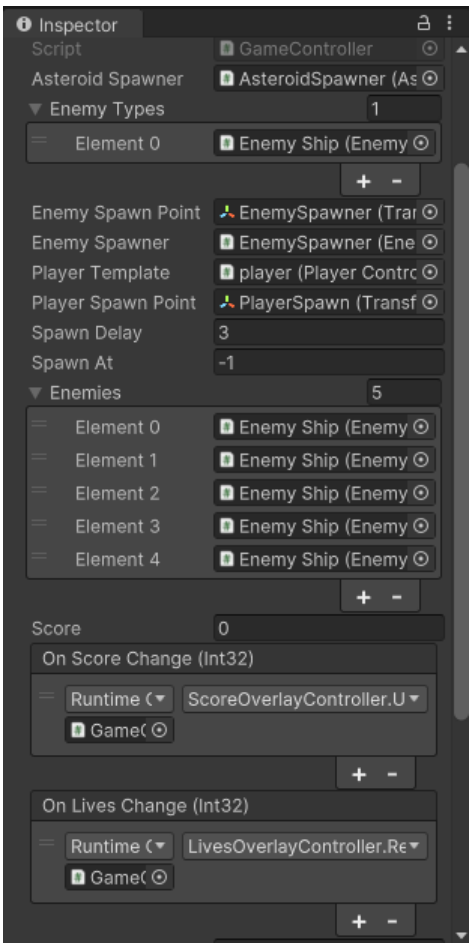
X

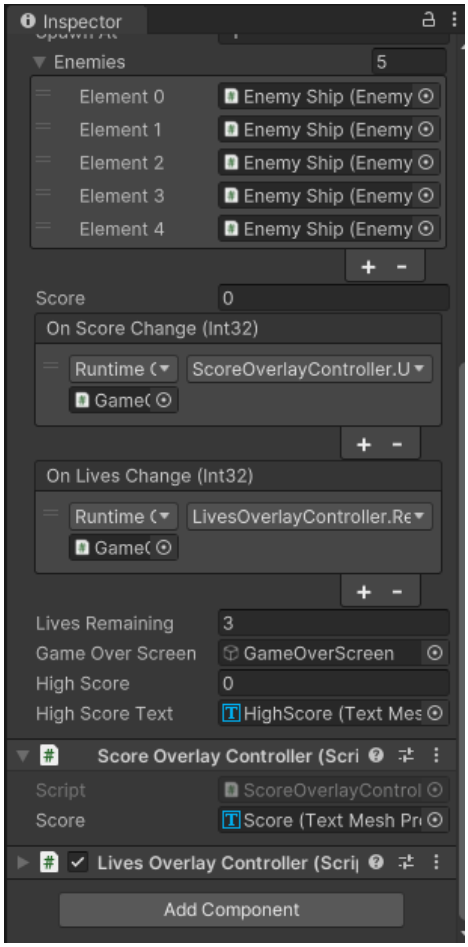
Project
Console
Animator
Animation
Preview
0
ShowSetting
0:00
0:05
0:10
0:15
0:20
0:25
0:30
Audio : Anchored Position
Mute : Anchored Position
Add Property
Dopesheet
Curves

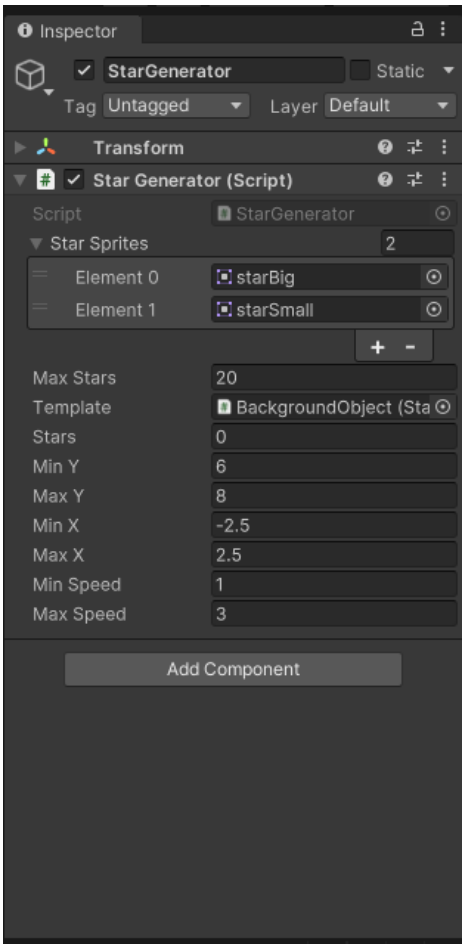
2.2 GAME SCENES

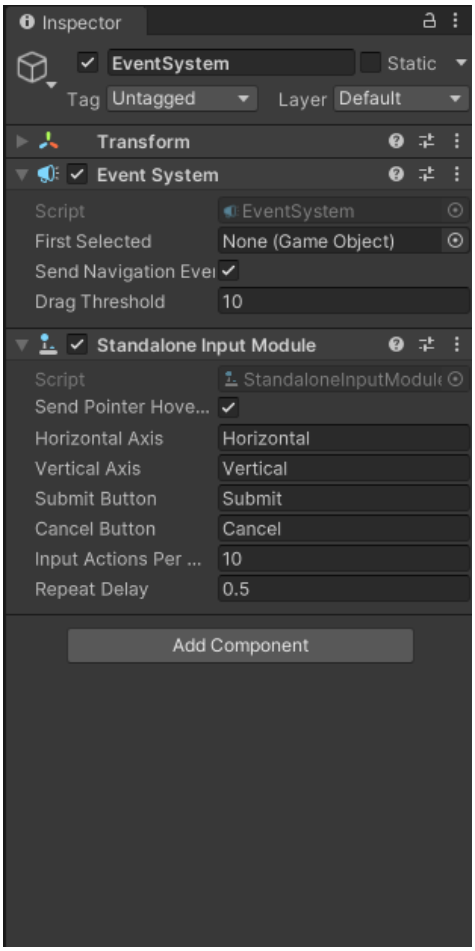


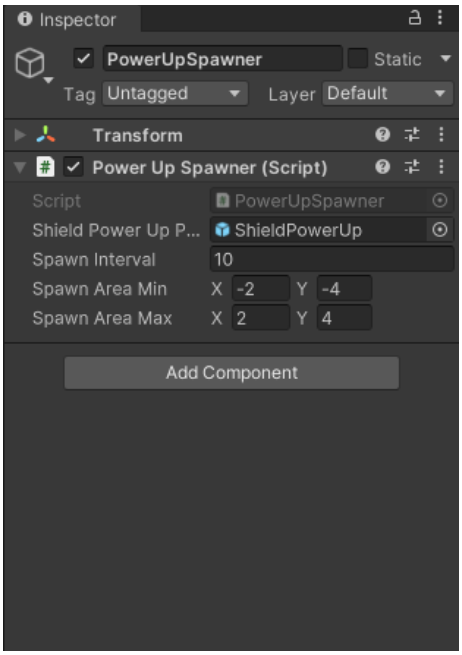


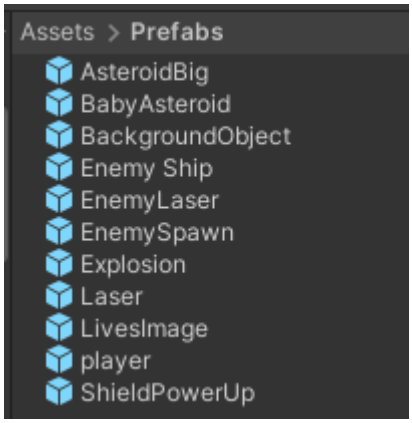


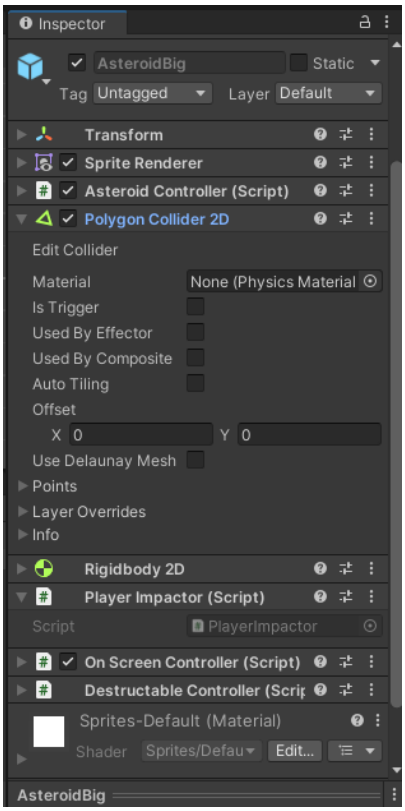


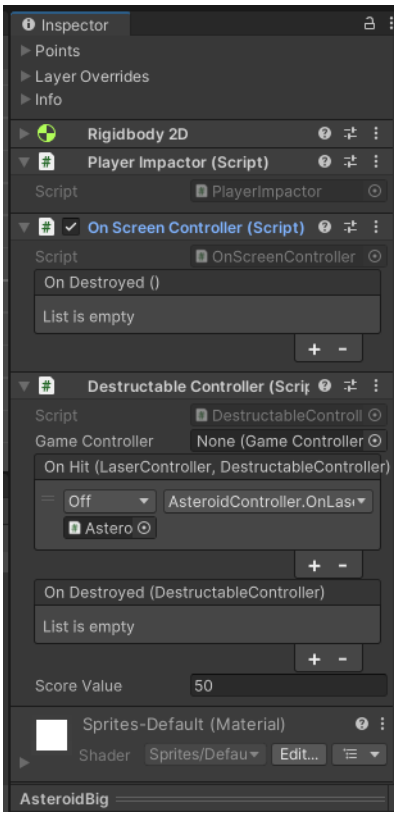

Inspector
StarGenerator
Static
Tag Untagged
Layer Default
Transform
Star Generator (Script)
Script StarGenerator
Star Sprites 2
Element 0 starBig
Element 1 starSmall
Max Stars 20
Template BackgroundObject (Sta
Stars 0
Min Y 6
Max Y 8
Min X -2.5
Max X 2.5
Min Speed 1
Max Speed 3
Add Component

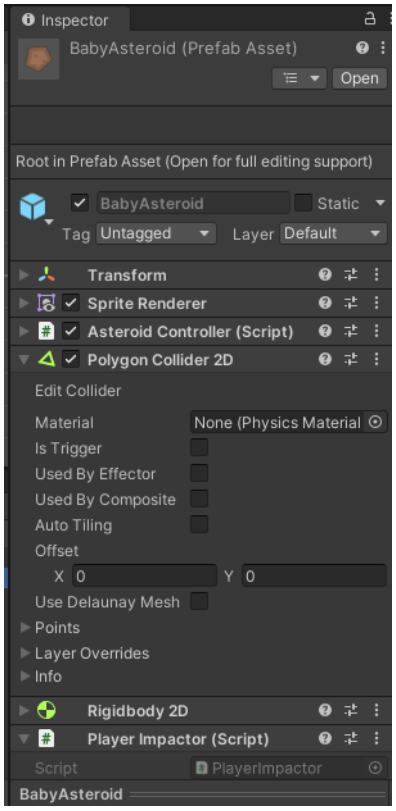

Inspector
EventSystem
Static
Tag Untagged
Layer Default
Transform
Event System
Script EventSystem
First Selected None (Game Object)
Send Navigation Evei
Drag Threshold 10
Standalone Input Module
Script StandaloneInputModul
Send Pointer Hove...
Horizontal Axis Horizontal
Vertical Axis Vertical
Submit Button Submit
Cancel Button Cancel
Input Actions Per ... 10
Repeat Delay 0.5
Add Component

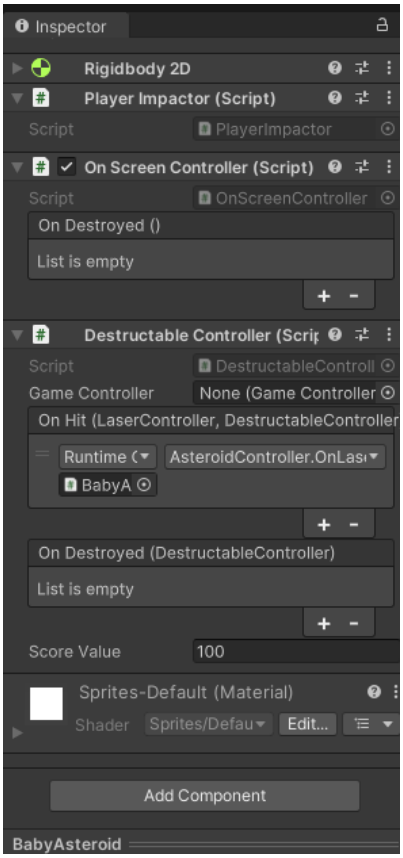

Inspector
PowerUpSpawner
Static
Tag Untagged
Layer Default
Transform
Power Up Spawner (Script)
Script PowerUpSpawner
Shield Power Up P... ShieldPowerUp
Spawn Interval 10
Spawn Area Min X -2 Y -4
Spawn Area Max X 2 Y 4
Add Component

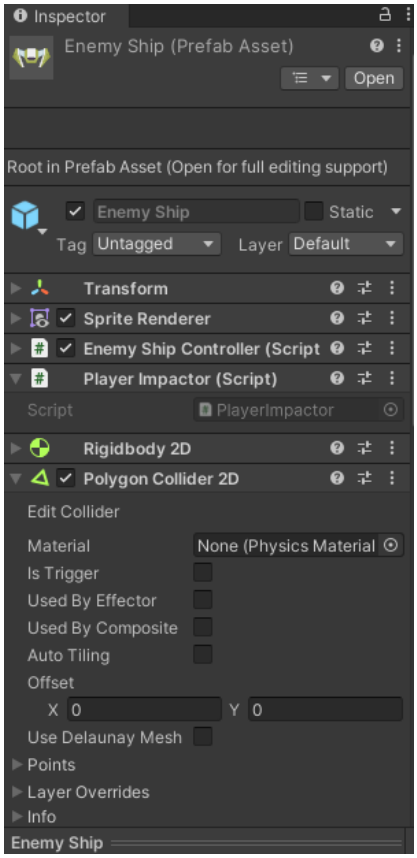

Assets > Prefabs
AsteroidBig
BabyAsteroid
BackgroundObject
Enemy Ship
EnemyLaser
EnemySpawn
Explosion
Laser
LivesImage
player
ShieldPowerUp

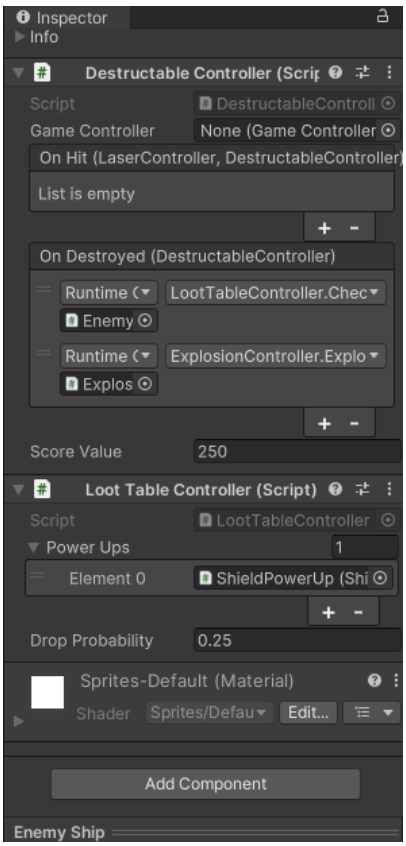

Inspector
AsteroidBig
Static
Tag Untagged
Layer Default
Transform
Sprite Renderer
Asteroid Controller (Script)
Polygon Collider 2D
Edit Collider
Material None (Physics Material
Is Trigger
Used By Effector
Used By Composite
Auto Tiling
Offset
X 0
Y 0
Use Delaunay Mesh
Points
Layer Overrides
Info
Rigidbody 2D
Player Impactor (Script)
Script PlayerImpactor
On Screen Controller (Script)
Destructable Controller (Scrip
Sprites-Default (Material)
Shader Sprites/Defau
Edit...
AsteroidBig

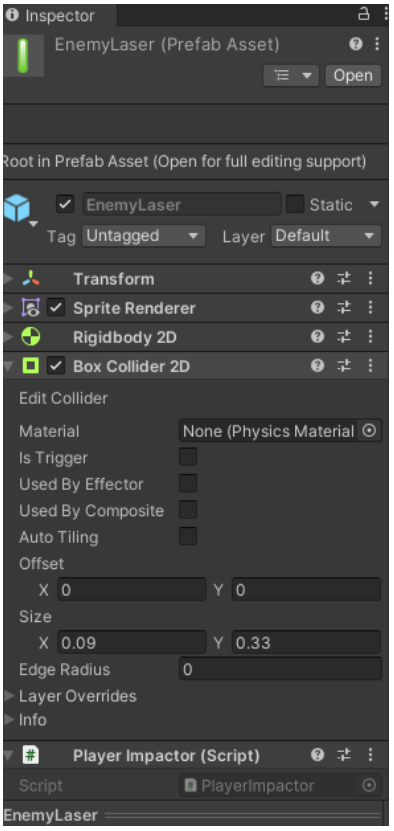

Inspector
Points
Layer Overrides
Info
Rigidbody 2D
Player Impactor (Script)
Script PlayerImpactor
On Screen Controller (Script)
Script OnScreenController
On Destroyed ()
List is empty
Destructable Controller (Scrip
Script DestructableControll
Game Controller None (Game Controller
On Hit (LaserController, DestructableController)
Off
AsteroidController.OnLas
Astero
On Destroyed (DestructableController)
List is empty
Score Value 50
Sprites-Default (Material)
Shader Sprites/Defau
Edit...
AsteroidBig

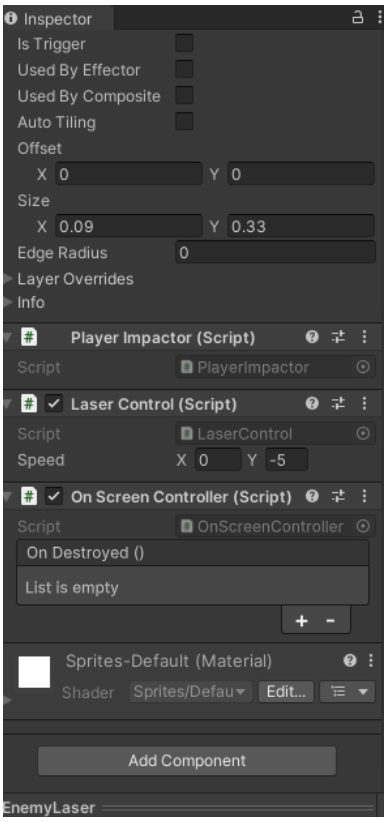

Inspector
BabyAsteroid (Prefab Asset)
Open
Root in Prefab Asset (Open for full editing support)
BabyAsteroid
Static
Tag Untagged
Layer Default
Transform
Sprite Renderer
Asteroid Controller (Script)
Polygon Collider 2D
Edit Collider
Material None (Physics Material
Is Trigger
Used By Effector
Used By Composite
Auto Tiling
Offset
X 0
Y 0
Use Delaunay Mesh
Points
Layer Overrides
Info
Rigidbody 2D
Player Impactor (Script)
Script PlayerImpactor
BabyAsteroid

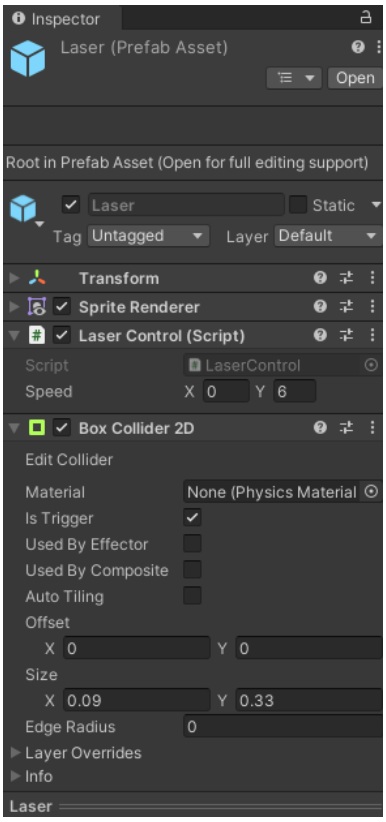

Inspector
Rigidbody 2D
Player Impactor (Script)
Script PlayerImpactor
On Screen Controller (Script)
Script OnScreenController
On Destroyed ()
List is empty
Destructable Controller (Scrip
Script DestructableControll
Game Controller None (Game Controller
On Hit (LaserController, DestructableController
Runtime
AsteroidController.OnLas
BabyA
On Destroyed (DestructableController)
List is empty
Score Value 100
Sprites-Default (Material)
Shader Sprites/Defau
Edit...
Add Component
BabyAsteroid

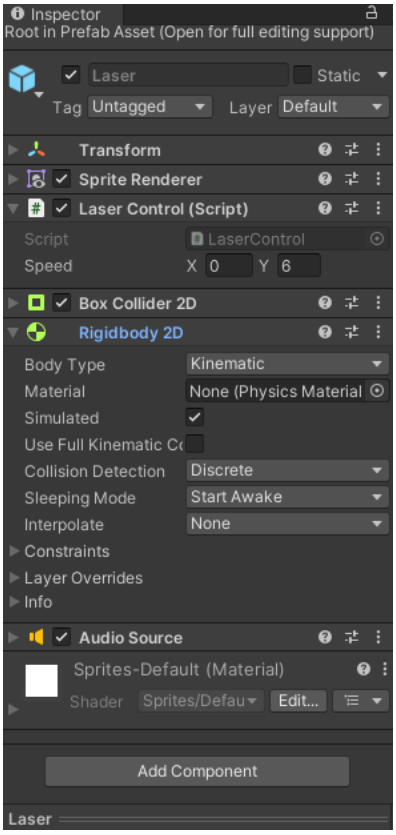

Inspector
Enemy Ship (Prefab Asset)
Open
Root in Prefab Asset (Open for full editing support)
Enemy Ship
Static
Tag Untagged
Layer Default
Transform
Sprite Renderer
Enemy Ship Controller (Script
Player Impactor (Script)
Script PlayerImpactor
Rigidbody 2D
Polygon Collider 2D
Edit Collider
Material None (Physics Material
Is Trigger
Used By Effector
Used By Composite
Auto Tiling
Offset
X 0
Y 0
Use Delaunay Mesh
Points
Layer Overrides
Info
Enemy Ship

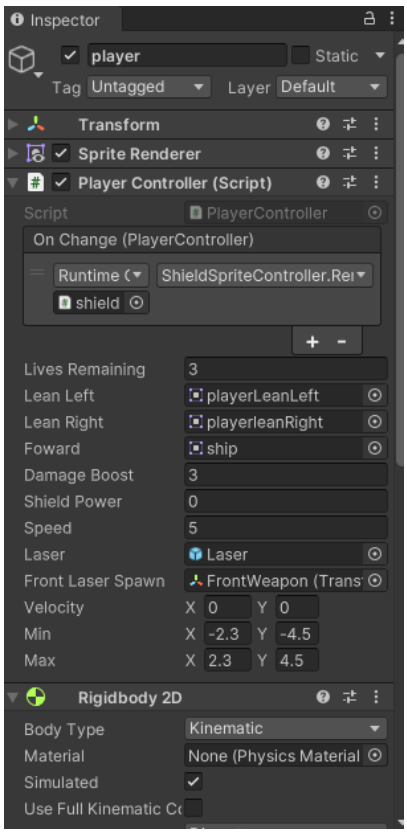

Inspector
Info
Destructable Controller (Scrip
Script DestructableControll
Game Controller None (Game Controller
On Hit (LaserController, DestructableController)
List is empty
On Destroyed (DestructableController)
Runtime
LootTableController.Chec
Enemy
Runtime
ExplosionController.Explo
Explos
Score Value 250
Loot Table Controller (Script)
Script LootTableController
Power Ups 1
Element 0
ShieldPowerUp (Shi
Drop Probability 0.25
Sprites-Default (Material)
Shader Sprites/Defau
Edit...
Add Component
Enemy Ship

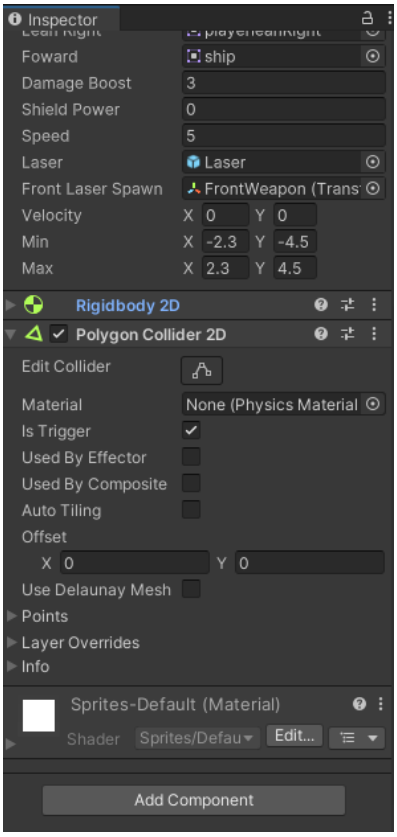

Inspector
EnemyLaser (Prefab Asset)
Open
Root in Prefab Asset (Open for full editing support)
EnemyLaser
Static
Tag Untagged
Layer Default
Transform
Sprite Renderer
Rigidbody 2D
Box Collider 2D
Edit Collider
Material None (Physics Material
Is Trigger
Used By Effector
Used By Composite
Auto Tiling
Offset
X 0 Y 0
Size
X 0.09 Y 0.33
Edge Radius 0
Layer Overrides
Info
Player Impactor (Script)
Script PlayerImpactor
EnemyLaser

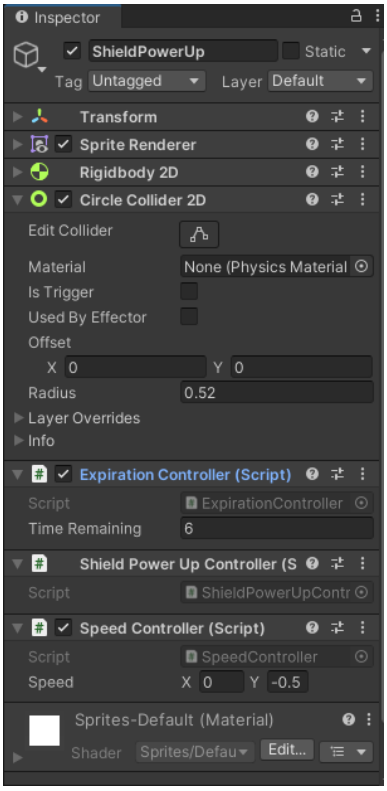

Inspector
Is Trigger
Used By Effector
Used By Composite
Auto Tiling
Offset
X 0 Y 0
Size
X 0.09 Y 0.33
Edge Radius 0
Layer Overrides
Info
Player Impactor (Script)
Script PlayerImpactor
Laser Control (Script)
Script LaserControl
Speed X 0 Y -5
On Screen Controller (Script)
Script OnScreenController
On Destroyed ()
List is empty
Sprites-Default (Material)
Shader Sprites/Defau
Edit...
Add Component
EnemyLaser

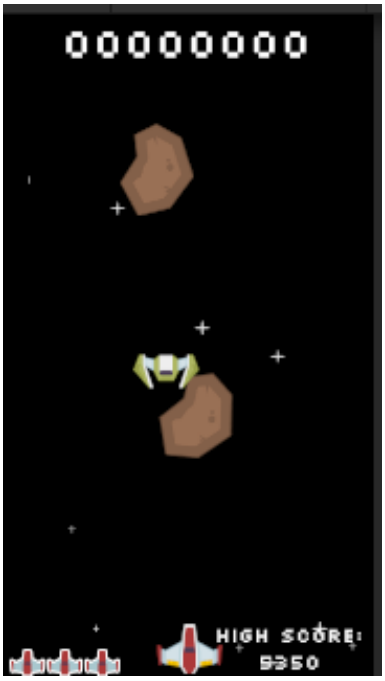

Inspector
Laser (Prefab Asset)
Open
Root in Prefab Asset (Open for full editing support)
Laser
Static
Tag Untagged
Layer Default
Transform
Sprite Renderer
Laser Control (Script)
Script LaserControl
Speed X 0 Y 6
Box Collider 2D
Edit Collider
Material None (Physics Material
Is Trigger
Used By Effector
Used By Composite
Auto Tiling
Offset
X 0 Y 0
Size
X 0.09 Y 0.33
Edge Radius 0
Layer Overrides
Info
Laser


Inspector
Root in Prefab Asset (Open for full editing support)
Laser
Static
Tag Untagged
Layer Default
Transform
Sprite Renderer
Laser Control (Script)
Script LaserControl
Speed X 0 Y 6
Box Collider 2D
Rigidbody 2D
Body Type Kinematic
Material None (Physics Material
Simulated
Use Full Kinematic Cc
Collision Detection Discrete
Sleeping Mode Start Awake
Interpolate None
Constraints
Layer Overrides
Info
Audio Source
Sprites-Default (Material)
Shader Sprites/Defau
Edit...
Add Component
Laser


Inspector
player
Static
Tag Untagged
Layer Default
Transform
Sprite Renderer
Player Controller (Script)
Script PlayerController
On Change (PlayerController)
Runtime
ShieldSpriteController.Rer
shield
Lives Remaining 3
Lean Left playerLeanLeft
Lean Right playerleanRight
Foward ship
Damage Boost 3
Shield Power 0
Speed 5
Laser Laser
Front Laser Spawn FrontWeapon (Trans
Velocity X 0 Y 0
Min X -2.3 Y -4.5
Max X 2.3 Y 4.5
Rigidbody 2D
Body Type Kinematic
Material None (Physics Material
Simulated
Use Full Kinematic Cc


Inspector
Foward ship
Damage Boost 3
Shield Power 0
Speed 5
Laser Laser
Front Laser Spawn FrontWeapon (Trans
Velocity X 0 Y 0
Min X -2.3 Y -4.5
Max X 2.3 Y 4.5
Rigidbody 2D
Polygon Collider 2D
Edit Collider
Material None (Physics Material
Is Trigger
Used By Effector
Used By Composite
Auto Tiling
Offset
X 0 Y 0
Use Delaunay Mesh
Points
Layer Overrides
Info
Sprites-Default (Material)
Shader Sprites/Defau
Edit...
Add Component

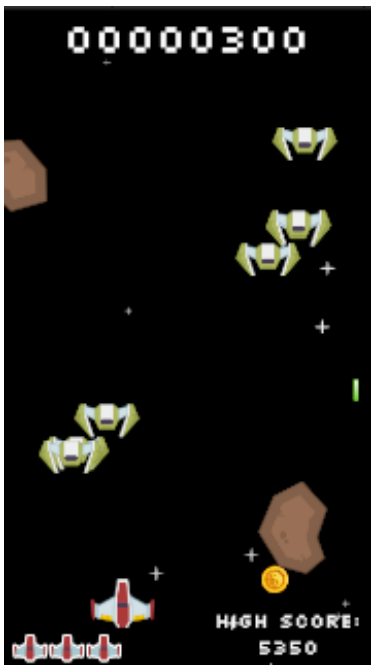

Inspector
ShieldPowerUp
Static
Tag Untagged
Layer Default
Transform
Sprite Renderer
Rigidbody 2D
Circle Collider 2D
Edit Collider
Material None (Physics Material
Is Trigger
Used By Effector
Offset
X 0
Y 0
Radius 0.52
Layer Overrides
Info
Expiration Controller (Script)
Script ExpirationController
Time Remaining 6
Shield Power Up Controller (S
Script ShieldPowerUpContr
Speed Controller (Script)
Script SpeedController
Speed X 0 Y -0.5
Sprites-Default (Material)
Shader Sprites/Defau
Edit...


00000000
HIGH SCORE:
5350

00000800
GAME OVER
RESTART
HIGH SCORE:
5350

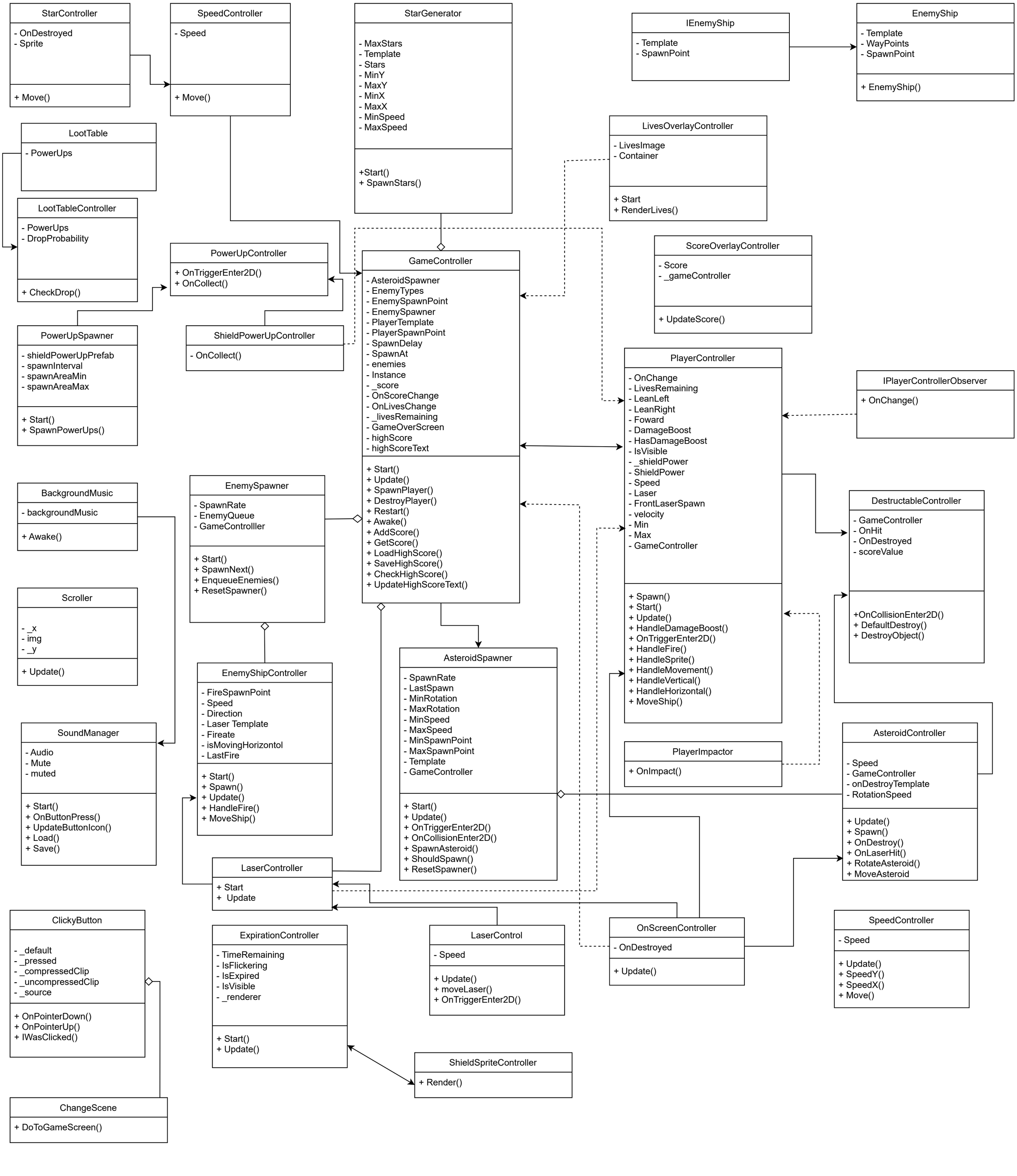
00000100
HIGH SCORE:
5350

00000000
HIGH SCORE:
5350


00000300
HIGH SCORE:
5350

3.0 UML Diagram

The provided UML diagram represents the structure and interactions of various components in our Space Maverick game project. It is used to illustrate the relationships between classes, their attributes, and their methods in a visual form, ensuring clarity in the system's design and functionality.


StarController
- OnDestroyed
- Sprite
+ Move()
SpeedController
- Speed
+ Move()
StarGenerator
- MaxStars
- Template
- Stars
- MinY
- MaxY
- MinX
- MaxX
- MinSpeed
- MaxSpeed
+Start()
+ SpawnStars()
IEnemyShip
- Template
- SpawnPoint
EnemyShip
- Template
- WayPoints
- SpawnPoint
+ EnemyShip()
LootTable
- PowerUps
LootTableController
- PowerUps
- DropProbability
+ CheckDrop()
LivesOverlayController
- LivesImage
- Container
+ Start
+ RenderLives()
PowerUpController
+ OnTriggerEnter2D()
+ OnCollect()
GameController
- AsteroidSpawner
- EnemyTypes
- EnemySpawnPoint
- EnemySpawner
- PlayerTemplate
- PlayerSpawnPoint
- SpawnDelay
- SpawnAt
- enemies
- Instance
- _score
- OnScoreChange
- OnLivesChange
- _livesRemaining
- GameOverScreen
- highScore
- highScoreText
+ Start()
+ Update()
+ SpawnPlayer()
+ DestroyPlayer()
+ Restart()
+ Awake()
+ AddScore()
+ GetScore()
+ LoadHighScore()
+ SaveHighScore()
+ CheckHighScore()
+ UpdateHighScoreText()
ScoreOverlayController
- Score
- _gameController
+ UpdateScore()
PowerUpSpawner
- shieldPowerUpPrefab
- spawnInterval
- spawnAreaMin
- spawnAreaMax
+ Start()
+ SpawnPowerUps()
ShieldPowerUpController
- OnCollect()
PlayerController
- OnChange
- LivesRemaining
- LeanLeft
- LeanRight
- Foward
- DamageBoost
- HasDamageBoost
- IsVisible
- _shieldPower
- ShieldPower
- Speed
- Laser
- FrontLaserSpawn
- velocity
- Min
- Max
- GameController
+ Spawn()
+ Start()
+ Update()
+ HandleDamageBoost()
+ OnTriggerEnter2D()
+ HandleFire()
+ HandleSprite()
+ HandleMovement()
+ HandleVertical()
+ HandleHorizontal()
+ MoveShip()
IPlayerControllerObserver
+ OnChange()
BackgroundMusic
- backgroundMusic
+ Awake()
EnemySpawner
- SpawnRate
- EnemyQueue
- GameControlller
+ Start()
+ SpawnNext()
+ EnqueueEnemies()
+ ResetSpawner()
DestructableController
- GameController
- OnHit
- OnDestroyed
- scoreValue
+OnCollisionEnter2D()
+ DefaultDestroy()
+ DestroyObject()
Scroller
- _x
- img
- _y
+ Update()
AsteroidSpawner
- SpawnRate
- LastSpawn
- MinRotation
- MaxRotation
- MinSpeed
- MaxSpeed
- MinSpawnPoint
- MaxSpawnPoint
- Template
- GameController
+ Start()
+ Update()
+ OnTriggerEnter2D()
+ OnCollisionEnter2D()
+ SpawnAsteroid()
+ ShouldSpawn()
+ ResetSpawner()
EnemyShipController
- FireSpawnPoint
- Speed
- Direction
- Laser Template
- Fireate
- isMovingHorizontol
- LastFire
+ Start()
+ Spawn()
+ Update()
+ HandleFire()
+ MoveShip()
PlayerImpactor
+ OnImpact()
AsteroidController
- Speed
- GameController
- onDestroyTemplate
- RotationSpeed
+ Update()
+ Spawn()
+ OnDestroy()
+ OnLaserHit()
+ RotateAsteroid()
+ MoveAsteroid
SoundManager
- Audio
- Mute
- muted
+ Start()
+ OnButtonPress()
+ UpdateButtonIcon()
+ Load()
+ Save()
LaserController
+ Start
+ Update
ClickyButton
- _default
- _pressed
- _compressedClip
- _uncompressedClip
- _source
+ OnPointerDown()
+ OnPointerUp()
+ IWasClicked()
ExpirationController
- TimeRemaining
- IsFlickering
- IsExpired
- IsVisible
- _renderer
+ Start()
+ Update()
LaserControl
- Speed
+ Update()
+ moveLaser()
+ OnTriggerEnter2D()
OnScreenController
- OnDestroyed
+ Update()
SpeedController
- Speed
+ Update()
+ SpeedY()
+ SpeedX()
+ Move()
ShieldSpriteController
+ Render()
ChangeScene
+ DoToGameScreen()

4.0 Evaluation of Unity Platform

Unity, developed by Unity Technologies, is one of the most popular real-time development platforms, renowned for its versatility and widespread application across multiple industries. Originally designed for game development, Unity has grown into a robust tool for creating interactive experiences, simulations, augmented reality (AR) and virtual reality (VR) applications, and even cinematic productions. Its wide adoption is a testament to its flexibility, scalability, and ability to meet the needs of both beginners and seasoned professionals. With a rich ecosystem, cross-platform deployment capabilities, and a strong support community, Unity has become a cornerstone in the world of digital content creation

1. Cross-Platform Support:
Unity supports over 20 platforms, including iOS, Android, PC, macOS, PlayStation, Xbox, VR/AR devices, and more. Developers can create a single project and deploy it across multiple platforms with minimal adjustments.

2. User-Friendly Interface:
Unity's interface is intuitive, making it accessible to beginners. The drag-and-drop functionality and visual scripting tools, like Bolt, enhance its usability for non-programmers.

3. Rich Asset Store:
The Unity Asset Store offers a vast library of assets, including 3D models, scripts, sounds, and plugins. These resources save time and reduce development costs.

4. Extensive Documentation and Community:
Unity has detailed documentation, tutorials, and a vibrant global community. Developers can easily find guides, forums, and support.

5. Real-Time Rendering and Visuals:
Unity's rendering capabilities, particularly with its High-Definition Render Pipeline (HDRP), enable high-quality graphics suitable for AAA games and cinematic experiences.

6. Support for AR/VR and Emerging Technologies:
Unity is a leader in AR/VR development, providing robust tools for creating immersive experiences. It's also widely adopted in industries like automotive, architecture, and healthcare for simulations.

7. Freemium Model:
Unity offers a free tier for individuals and small teams, making it an excellent choice for indie developers and startups.

Unity stands out as one of the most flexible and beginner-friendly platforms for games and content creation. Its strengths lie in its adaptability, community support, and cross-platform capabilities, while its limitations mainly affect highly advanced or specialized projects. For developers and organizations seeking an accessible yet powerful tool for digital content creation, Unity remains a top choice.