# Game Engine API Outline

This document provides an API outline for a simple game engine written in C#, using the MonoGame framework for 3D rendering, input, audio and lighting, and the bepuphysics library for physics. Note that many useful types such as Vector3, Matrix and Model are provided in the MonoGame framework.

The document shows the structure and functionality of the engine through listing different structures and systems. These are just ideas about important parts that may or may not be needed when implementing the actual engine.

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# Structures

## Class: Entity

Attributes:

- int ID

## Class: ComponentArray

Methods:

- Add(Entity entity, Component component)
- Remove(Entity entity)
- Get(Entity entity)

# Entity handling

## Class: EntityManager

Methods:

- CreateEntity()
- DestroyEntity(Entity entity)
- AddComponent(Entity entity, Component component)
- RemoveComponent<T>(Entity entity)
- GetComponent<T>(Entity entity)

# Components

## Class: TransformComponent

Attributes:

- Vector3 Position
- Quaternion Rotation
- Vector3 Scale

## Class: VelocityComponent

Attributes:

- Vector3 LinearVelocity
- Vector3 AngularVelocity

## Class: MeshComponent

Attributes:

- Model Mesh

- Matrix Transform

## Class: CameraComponent

Attributes:

- Matrix ViewMatrix
- Matrix ProjectionMatrix

## Class: LightComponent

Attributes:

- Vector3 Position
- Vector3 Direction
- Color Color
- float Intensity

## Class: RigidBodyComponent

Attributes:

- float Mass
- BodyHandle BodyHandle - *from BepuPhysics*
- Velocity Velocity

## Class: ColliderComponent

Attributes:

- CollidableHandle CollidableHandle - *from BepuPhysics*
- TypedIndex ShapeIndex - *from BepuPhysics*
- Transform Transform

# Systems

## Class: RenderingSystem

Methods:

- Render()

## Class: CameraSystem

Methods:

- Update()

## Class: LightingSystem

Methods:

- Update()

## Class: MovementSystem

Methods:

- Update()

## Class: PhysicsSystem

Methods:

- Update()

## Class: InputSystem

Methods:

- Update()
- KeyPressed(Key key)
- KeyReleased(Key key)

## Class: AudioSystem

Methods:

- Update()
- PlaySound()
- PlayMusic()

## Class: AISystem

Methods:

- Update()
- BehaviorTree()

# Game loop

## Class: Game

Methods:

- Update()
- Render()
- Exit()