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.

Structures

Class: Entity

Attributes:
- int ID

Class: ComponentArray

Attributes:
- List<object> Components

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

Entity handling

Class: EntityManager

Attributes:
- List<Entity> Entities
- ComponentArray ComponentArray
- *(List<Archetype> Archetypes) - can be implemented for efficient component queries*

Methods:
- CreateEntity()
- DestroyEntity(Entity entity)
- AddComponent(Entity entity, Component component)
- RemoveComponent(Entity entity)
- GetComponent(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()