GAME PROGRAMMING

CS 3540

CAGLAR YILDIRIM

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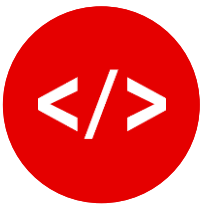
About the Course

UNITY 3D



C# PROGRAMMING

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Transformations

Physics

Lighting

Collision Detection

Shooting Projectiles

Scores and Levels

Health and Damage

NPC Behavior

Player Control

Game AI

User Interface

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Unity 3D as a Game Engine

Game engine:

- Software development environment or framework
- Supports and combines several core components of games
- Assets, lighting, audio, special effects, physics, animation, interactivity, and scripting

Unity 3D:

- Free for educational projects and small-scale projects
- Very popular among studios, independent developers, artists, etc.
- Great documentation, tutorials, and community support

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Course Requirements

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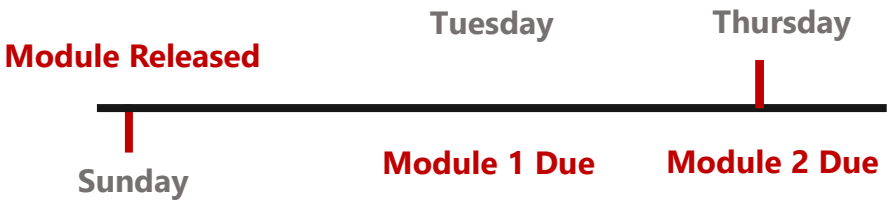
Online Learning

Asynchronous content delivery



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What will you do in this course?

Syllabus

Schedule

Canvas Page

Final Project

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Final Project

GOAL

To give you hands-on experience applying the skills from this class to a life-like game development project in which you conceptualize and develop a 3D game from scratch

DELIVERABLES

- FP1: Game Design Document
- FP2: Level Design Prototype
- FP3: Alpha Game Release
- FP4: Beta Game Release
- FP5: Gold Master Release
- FP6: Game Demo
- FP7: Peer Evaluation

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Final Project: Requirements

Be a 3D video game.

Feature high interactivity and appropriate visual and audio effects.

Use at least three different animations for visual effects.

Have a clear story and should support progression.

Have at least three levels with various game mechanics in each level.

Have an intuitive user interface that displays progress/time/health/etc.

Use a game manager that keeps track of time/level/health/ammo/etc.

Implement game AI and use intelligent behaviors for enemies and NPCs.

Have a main menu

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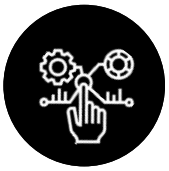

Foundations of Game Development

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Games…

What is in a video game?

What are some game genres?

What are game mechanics?

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Game Elements

Game world

Storytelling

Game logic and rules (gameplay)

Characters (players and enemies)

Game mechanics

Challenge and progress

Exploration and strategy

Feedback and rewards

Aesthetics

Interactivity

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Game Mechanics

Sicart (2008)

> Methods invoked by agents, designed for interaction with the game state.

Järvinen (2008):

> “Game mechanics are best described with verbs“
>
> e.g., jump, look, switch weapons, slash boxes

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Game Design Documentation

High Concept Document

> To flush out your vision for the game
>
> Defines the scope of the game and basic game logic
>
> Intentionally brief

Game Design Document

> To flesh out your game with all the details
>
> e.g., world, story, characters, core mechanics, aesthetics, etc.
>
> Intentionally detailed

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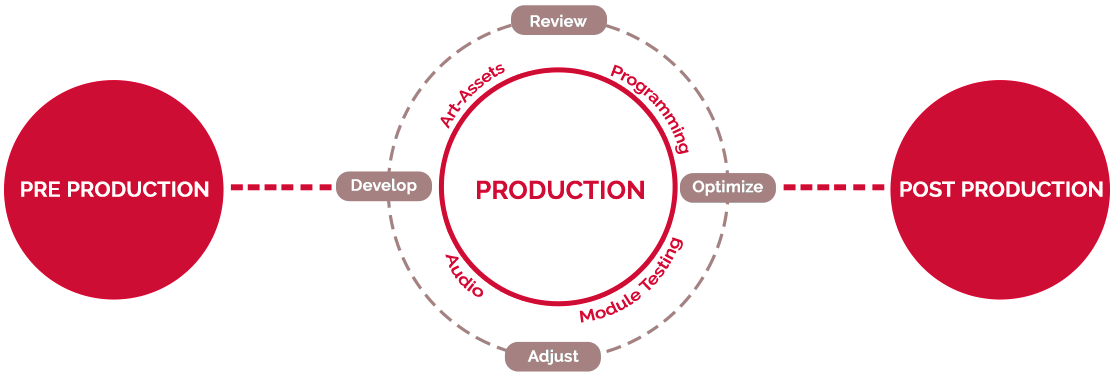
Game Development Life Cycle



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Pre-Production

Game Concept

Ideation and brainstorming

Game Design Documentation

The core plan for features and game scope

Prototyping

Initial implementations such as sketches, grayboxing, etc.

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Production

Initial Production

Main cycle of development and Content creation

Implementation of core gameplay features

Production Stages

Alpha: Core gameplay features are implemented

Beta: Complete version of the game with fully functioning core game play features

Gold: Quality check and ready to be launched for the public release

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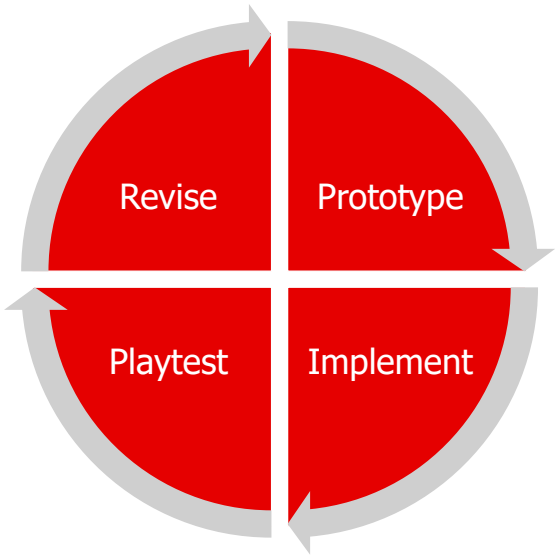
Production: An Iterative Process



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Post-Production

All actions after the game has been released

- Promotions
- Maintenance
- Patches
- Expansions
- Live content

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Installing Unity 3D

https://unity.com/download

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Unity 3D Environment

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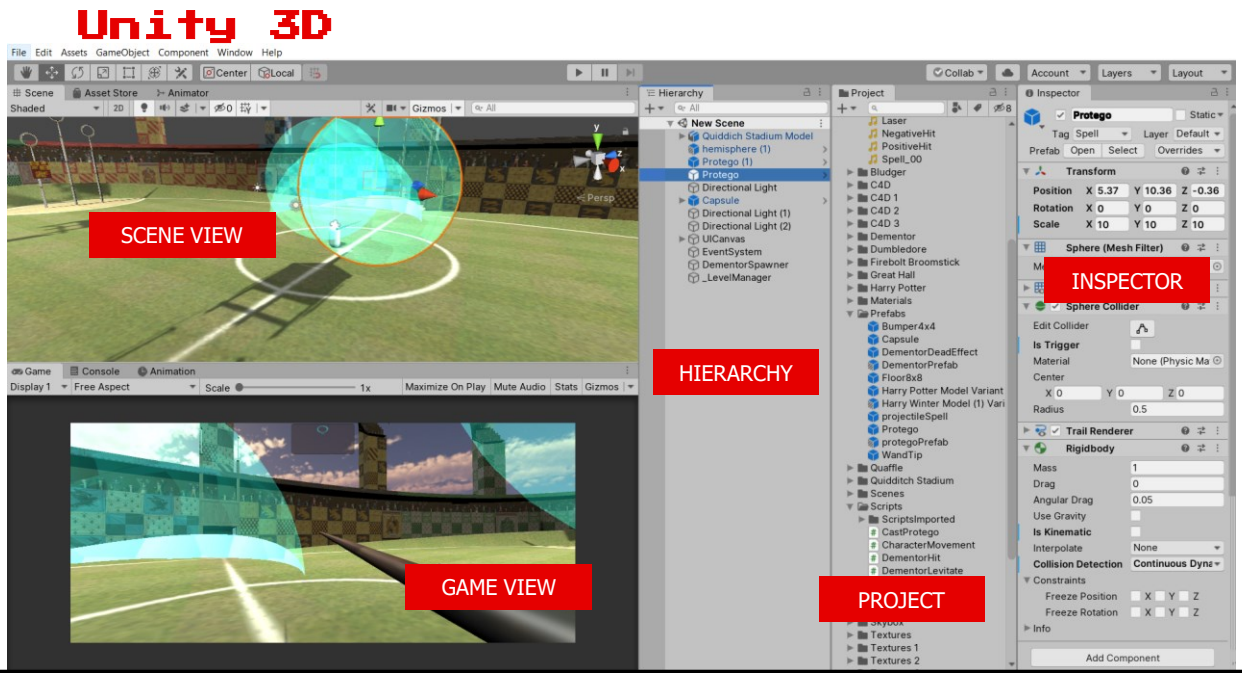

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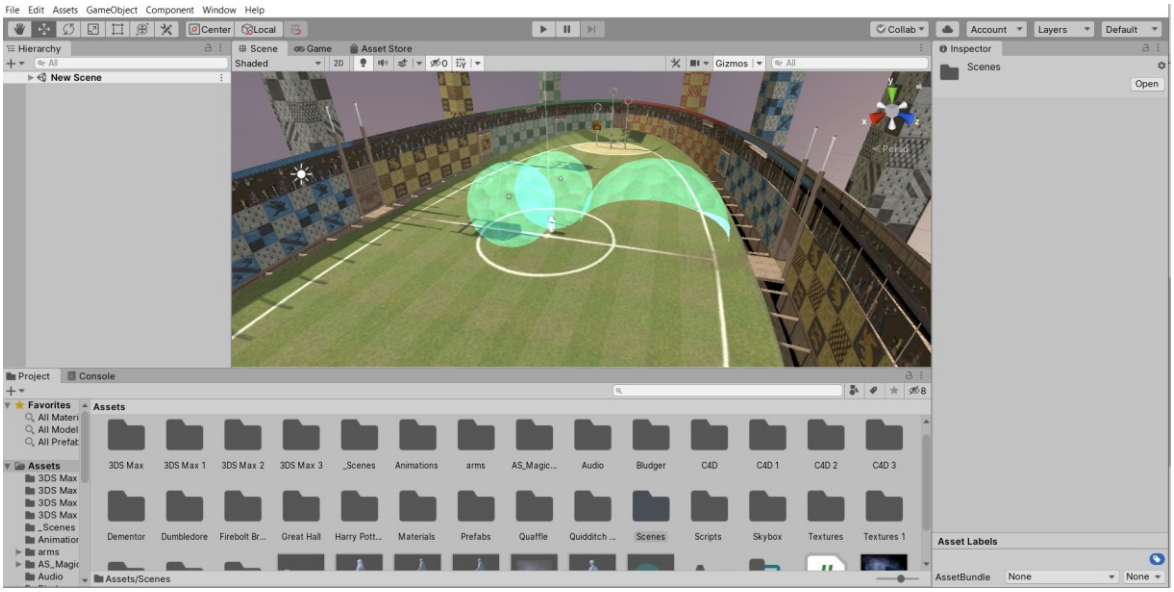
Unity 3D 2019.3



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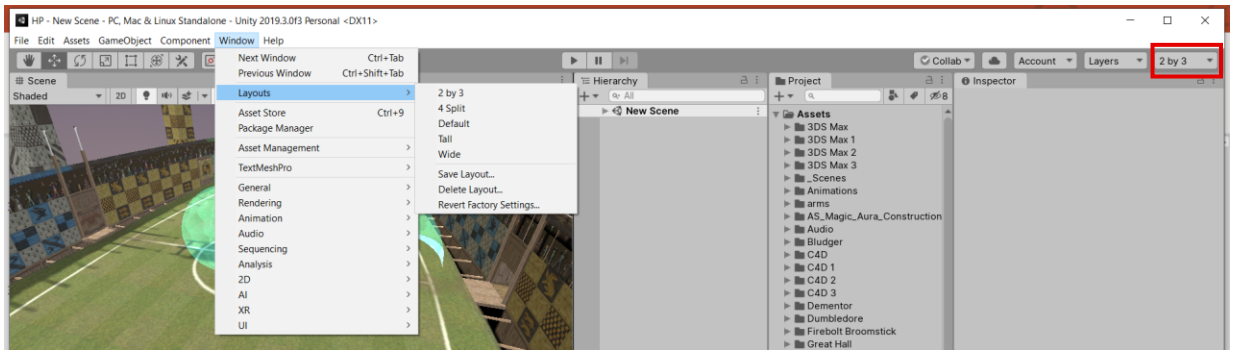
Unity 3D

Can change your Layout through Windows > Layouts



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Hello Cube

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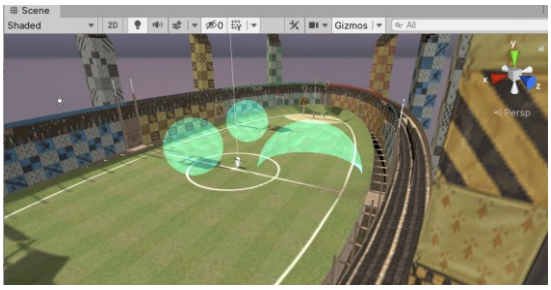
Unity 3D: Scenes

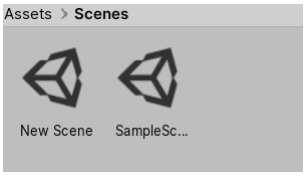
Scenes:

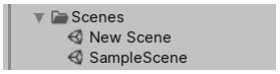
Contain the environments and menus of your game

A scene is essentially a level of your game

A project can (and usually does) contain multiple scenes







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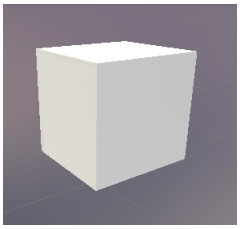
Unity 3D: GameObjects

Every object in your game is a **GameObject**

Players, collectibles, cameras, lights, and so on



GameObjects are more like containers or placeholders

They can't do anything on their own

Need to add some properties to GameObjects

Using **Components**

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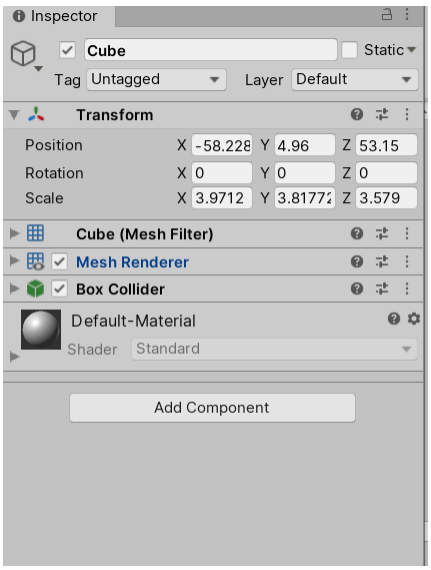
Unity 3D: Components

Define and control the behavior of GameObjects they are attached to

Implement the real functionality expected of the GameObjects

Provide a multitude of editable properties



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Unity 3D: Materials

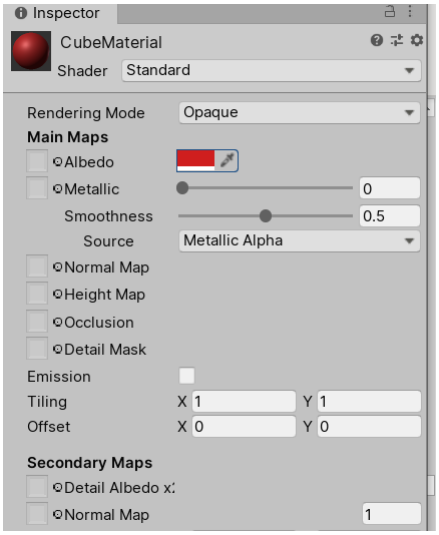
Define how a surface should be rendered

Can change the appearance of a GameObject's surface

Combines information from

- Textures,
- Tiling information,
- Color tints and more

The Albedo parameter controls the base color of the surface.



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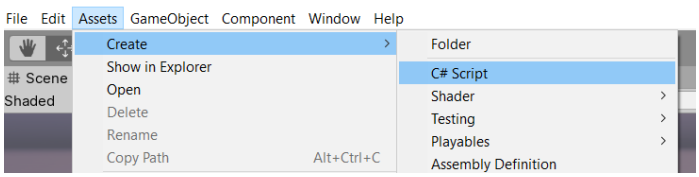
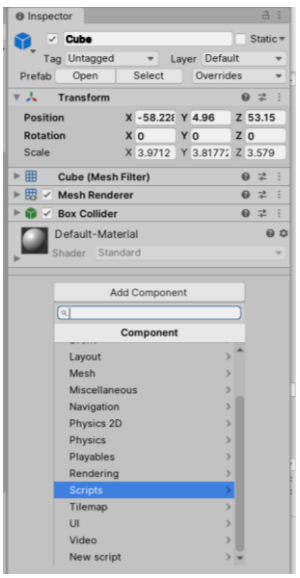
Unity 3D: Scripts

Scripts are Components too!

Allow you to write your own Components

Enable you to customize GameObjects





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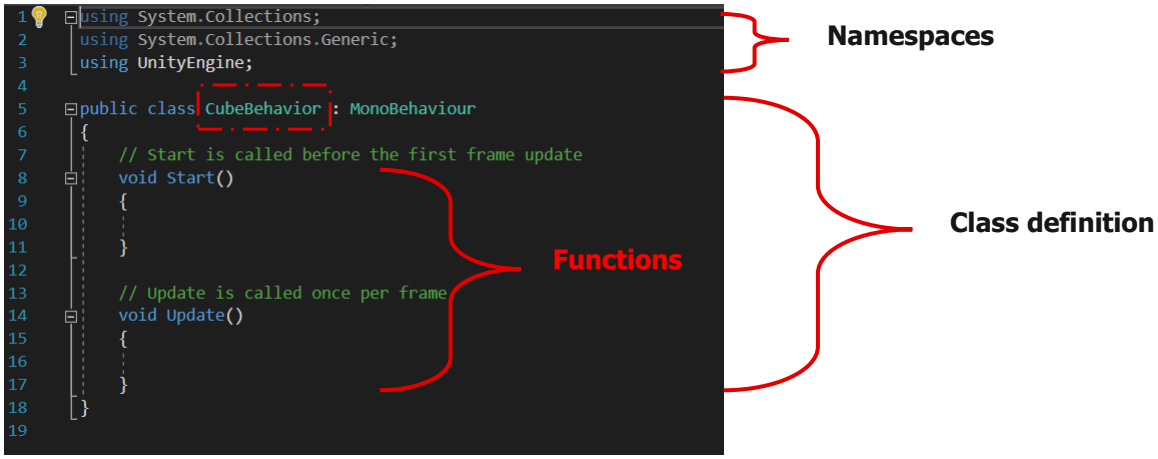
Anatomy of a Script File

All scripts, and thus classes, derive from the built-in class MonoBehaviour



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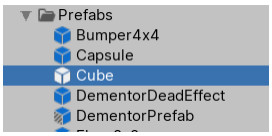
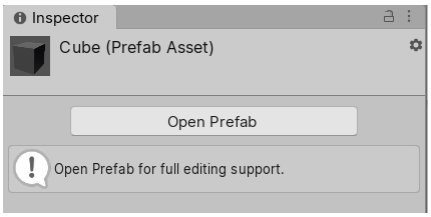
Unity 3D: Prefabs

Allows you to create, configure, and store a GameObject with all its components

Can be thought of as templates

Can use multiple instances of a prefab in your scene





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Readings

https://docs.unity3d.com/Manual/LearningtheInterface.html
https://docs.unity3d.com/Manual/CreatingScenes.html
https://docs.unity3d.com/Manual/GameObjects.html
https://docs.unity3d.com/Manual/Components.html
https://docs.unity3d.com/Manual/Materials.html
https://docs.unity3d.com/Manual/ScriptingSection.html
https://docs.unity3d.com/Manual/Prefabs.html