COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Computer Engineering

Lecturer : Dr. Noureldin S. Eissa / Eng. Ahmed Zakaria Talha

Course Name : Multimedia and Virtual Reality Systems (Game Programming)

Course Code : CC447   **Time allowed :** 4 hours

Date : 10/01/2024   **Start time** : 10:00 AM

Final Exam

Kaya's Adventure

Scenario:

You are tasked with creating a game environment for an adventurous quest featuring a character named Kaya. Kaya must navigate through a beautifully designed terrain to find a magical staff that will activate moving platforms, allowing her to reach the top of a mountain where a sacred tree awaits. The game must be completed within a time limit of 360 seconds, or Kaya will face an unfortunate demise.

Question 1: (20 points)

Terrain Setup:
- Use the provided heightmap and layers for terrain.
- Rocky layer for elevations and mountains.
- Grass layer for banks and roadsides.
- Dirt/pebble layer for roads.
- Place grass and mushrooms at your discretion. (You must put some grass and mushrooms)

Atmospheric Effects:
- Implement a natural-looking wind effect throughout the scene.
- Create a raining effect using particle systems that covers a 100x100 area above Kaya. (Alternatively, a static rain fixed above the terrain can be used.)
- Have a fog of 0.001 units.
- All scene lighting must directly come from the provided skyboxes.

Object Placement:
- Put at least 500 trees, a mix of the two provided tree prefabs.
- Position 3 rocks (provided assets) in designated spots (refer to the table at the end).

Overlay texts:
- Only a text showing Kaya's remaining time is shown on the top at the middle of the screen.

Kaya's Movements:
- Kaya is controlled using Unity's character controller with root motion.
- Kaya has animations for Idle, Walk, Run, Jump Up, Air (Falling), Landing, Dying, and Idle Resting (Sitting).
- Movement using **'W', 'A', 'S', and 'D'**, with **Shift** for sprinting.
- Jumping with the **space bar**, with forward thrust based on the movement speed before the jump. (ranging from 2.0 to 4.0)

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- Kaya's lost staff is placed near any of the 3 rocks, positioned 10 units in front (the rock is selected randomly at the beginning of each game).
- Pick up the staff by pressing **Left-Ctrl,** only when in proximity, causing a red point light to shine**.** Kaya will be holding the staff in its right hand**.**

Mini map:
- Implement a mini map that can be toggled ON and OFF by pressing the ''**M'** key.
- The mini map should show a top view of the whole scene fixated above Kaya.
- The mini map must be always moving with Kaya.
- The mini map must be anchored to the top right of the screen and has a width and height equal to 25% of the whole viewport.

Camera:
- A freelook cinemachine must be following Kaya.
- The details are provided in the table at the end.

Question 2: (10 points)

- **Animations must be set as follows:**
  - Root motion for ground movements.
  - Jumping is accomplished in three steps (Jump Up, Falling(Air), and Landing).
  - Kaya can fall off heights. In this case the falling animation should be played.
  - If no movements are detected, the idle animation should be playing.
  - If Kaya is walking, the walking animation must be played.
  - If Kaya is running, the running animation must be played.
  - As soon as Kaya picks the staff, the pick-up animation must be played, however, the staff is only picked at the appropriate animation time (When Kaya is crouching and grabbing it with its hands).
  - If Kaya wins, the sitting idle meditation animation must keep playing.
  - If Kaya dies, the dying animation will play once.

- **Implement A Way Finder Mechanism**
  - If the player is pressing (and holding) the **TAB** key, a transparent bluish arrow should appear above Kaya's head.
  - The arrow points Kaya to the exact location of the staff. (in front of any of the 3 rocks).
  - As Kaya moves, the arrow must allows be pointing to where the staff is.
  - Use the provided asset for the arrow.

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Question 3: (5 points)

Implement the following:
- As soon as Kaya picks up the magical staff, it will be activated, and a red shiny point light will be activated.
- Kaya must hold the staff in its right hand throughout the game.
- Seamless transition when picking the staff from the ground. (e.g. make sure Kaya is in proximity of the staff first. Picking animation should not be played otherwise).
- As soon as Kaya picks up the staff, the day must switch to night. (use the provided skyboxes)
- The skyboxes are always rotating (Pick a speed at your discretion).

Question 4: (5 points)

Implement the following:

Platforms:
- There are a total of 3 platforms.
- Platforms are tactically placed (refer to the table at the end).
- After obtaining the staff, Kaya can activate platforms by jumping on them.
- Each platform moves Kaya to the next one. Platform can move forward only when Kaya is on top.
- Whenever Kaya leaves a platform, it must go back to its original starting location.

Win/Lose:
- Upon reaching the sacred tree, Kaya sits down to meditate (animation provided), marking the successful completion of the game.
- If the timer expires, Kaya dies (and the dying animation plays once), marking a defeat.

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Appendix Table

Prefab/ Item/ GameObject	Properties	Comments
Terrain	1) **Dimensions:** 500x500x500 2) **Position:** (0, 0, 0) 3) Has Grass, Mushrooms, and at least 500 trees mixed between two types. 4) Detail Distance: 80 5) Billboard start: at least 50 6) Tree distance: at least 2,000 7) Create a WindZone for the whole scene (Wind parameters are at your discretion) 8) A directional light with a solid white color and a rotation of (50, -30, 0) must be placed in the scene. 9) Make sure the trees have colliders.	Heightmap for the terrain is provided as an asset. Grass and mushroom assets are provided. Layers for the terrain are provided. Trees assets are provided.
Kaya	1) **Position:** (250, 6, 64) 2) **Moves using Root Motion** 3) **Jump air speed** depends on type of movement before jumping (walking or running). 4) **Jump** amplitude should be set to 7.0	Kaya asset and all animations are provided. Make sure the animations and rigging are set properly.
Camera	1) **Freelook Cinemachine.** 2) **Must be following and looking** at Kaya all the time. 3) **Locked to Kaya on assign.** 4) Must recenter to Kaya's heading after 2 seconds, with a recentering time of 1 second. 5) The rigs have the following properties: **Top:** Height: 3, Radius: 7 **Middle:** Height: 2, Radius: 5 **Bottom:** Height: 1, Radius: 3 6) All the **damping** values for the rig's bodies must be set to (0, 0, 0)	
Rocks	A total of **three** rocks are placed in positions: (360, 2, 60), (125, 1.5, 300), and (260, 1, 370).	

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Magical staff	1) The staff is randomly placed in front of any of the three rocks at the beginning of the game. 2) The staff is originally laid down flat on the ground (with no lighting). 3) As soon as Kaya picks it up, it lights up with the following light at its top: Red **Point** light with a range of 10, intensity of 10, and hard shadows.	An asset is provided for the staff. You need to implement the lighting.
Way finder	1) The way finder should appear right above Kaya's head as long as the player is pressing the **TAB** key. (Holding down). 2) The Way finder must have a blueish transparent color (values for the color and transparency are at your discretion) 3) The way finder will always point to the exact location of the magical staff.	Arrow asset if provided for the way finder.
Platforms	1) A total of 3 platforms will help Kaya reach the top. 2) The platforms can be activated only if Kaya has the magical staff. 3) An activated platform will move as soon as Kaya mounts it and goes back to its original starting location as soon as Kaya leaves it. 4) When the platform reaches the end and Kaya is still on top, it will NOT go back to its original location. 5) The platforms are moving as follows: **Platform 1:** Moves from (260, 7, 86) to (240, 16, 100). **Platform 2:** Moves from (232, 15, 100) to (232, 60, 100). **Platform 3:** Moves from (232, 60, 105) to (232, 75, 140).	The asset for the platforms is provided.

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The sacred tree	1) The sacred tree is placed at (245, 70, 160). 2) Has a scale (not import size) of (0.1, 0.1, 0.1) 3) Kaya should win as soon as it's in proximity with the sacred tree.	The asset for the sacred tree is provided.

IMPORTANT NOTES:

1) **YOU MUST HAVE A VIDEO RECORDING OF THE GAME'S DEVELOPMENT. YOU WILL RECEIVE A GRADE OF 'F' IF THE VIDEO ISN'T SUBMITTED. THIS IS STRICT. NO EXCUSES WILL BE ENTERTAINED.**
2) **Make sure you configure the imported assets properly. Remove all unnecessary components.**
3) **Remove all unused assets from your project.**
4) **You will submit a compressed .zip/.rar file containing the whole Unity project along with the assets.**
5) You can improvise regarding any required parameters that have not been specified in the exam (e.g., animation transitions, Wind zone parameters, etc.)
6) You are free to use any resources, including the internet or previous codes.
7) You are NOT ALLOWED to ask others for specific help regarding your project. This includes:
   a. Posting on a social group.
   b. Asking someone else for help.
   c. Using AI GPT tools.
8) You can check the DEMO gameplay videos for the expected output.