Game Design: Technical Documentation
Unity Version: 2022.3.4f1

Game Ideas:

- Berb Hike
- Icy Porch

We all came to the agreement that we wanted a 2D puzzle game, because what we wanted to learn was level design and level patterns.

Berb Hike is our final idea as it has the best representation of level patterns, as well as it being a short game

Berb Hike:

A simple 2D puzzle game where the player (a chicken) travels along dice faces to find the right path. This game was made for the 2022 Game Jam.

Limitations:

- Lack of UI

As a group we decided that we will not only be cloning the game, but we will be adding another factor to it. We took inspiration from another game, where it teaches children about the Islamic culture. From that, we wanted to add an educational factor to our clone of Berb Hike.

<u>Educational Aspect of the game explained :</u>

In cloning Berb Hike,we wanted to ensure that not only do we recreate the core mechanics of the game but we also wanted players to take away from the game more than the fact that the mechanics of game work well with the level of difficulty and the level design progression of the game. As such , we decided to give the game a theme , namely the "Player Impact on the Ecosystems and Agricultural Practices". Central to this theme was making players understand how the core mechanics of the dice pattens on the different tiles types that cause themto count up and down could also be tied to an important issue of clomate change and the impact its has on the overall ecosystem. We wanted players to not only look forward to just collecting the start but to also understand the implications of what moving away from an icy tile , thereby melting the ice caps means on bigger scale that relates to the rise in sea levels. When player begin to understand the connecton between the moves they make in the game and the impact of those when tied to the theme, they psychologically also come to learn and understand the importance of being aware of Climate change and the role that humans play (i.e the player participating in the actual game) in contributing to it.

Specific examples of the incorporation of the educational aspect of the game:

All Icy Tiles [Counting down dice pattern Theme Logic explained:]

In the picture above, players see the direct impact of their actions on the environment. When they leave the Icy (Blue) tiles, one ice cap 'melts' or gets destroyed, symbolizing the effects of rising global temperatures caused by burning trees (Grassy tile with trees). The red 'marker' tracks the decrease in ice caps, indicating a rise in sea levels. This mechanic teaches players that their actions, like those of humans in real life, can have a significant impact on the ecosystem.

All Desert Tiles [Counting Up Dice pattern theme logic explained]:

Similarly , in the picture above , player see the direct impact of their actions on the environment(agriculturally). When they leave the desert tile, the number of crops on the tile goes up, symboling the effects of the lack of water underground to support the addition of crops in a small space. As a result, the more the number of crops increases , the more the land gets drier. The "brown" marker tracks the increase in the number of crops "farmed" indicating how dry the land gets because of the latter action.This mechanic teaches players that their actions, like those of humans in real life, can have a significant impact on the agricultural aspects of the land.

All Lava Tiles [Counting up and down theme logic explained]:

Similarly , in the picture above , player see the direct impact of their actions on the environment. When they leave the lava tile, the number of lava portions on the tile can either go up or down or vise versa. This symbolizes the idea of a large quantity of lava saturation on land and in turn lead to the possibility of volcanic eruptions. As a result , the higher the "red-orange" marker goes up, the stronger the lava portions become , indicating a closer possibility of volcanic activity , caused by the player actions.This mechanic teaches players that their actions, like those of humans in real life, can have a significant impact on the agricultural aspects of the land.

Technical Code Implementation explained[Main Systems only] :

Tile Logic :

```
void Start()
{
    UpdateObstacles();
    if (autofixTile)
    {
        transform.position = new Vector3(Mathf.Round(transform.position.x / 3) * 3, Mathf.Round(transform.position.y / 3) * 3, 1);
    }

}

1 reference
private void ChangeNumber()
{
    switch (type)
    {
        case TileType.Desert:
            currentNumber++;
            break;
        case TileType.Icy:
            currentNumber--;
            break;
        case TileType.Lava:
            currentNumber = (TileNumber)(5 - (int)currentNumber);
            break;
    }

    if ((int)currentNumber > 5 || (int)currentNumber < 0)
    {
        Destroy(gameObject);
        return;
    }

    UpdateObstacles();
}

1 reference
public void OnPlayerLeave() // added this method so its eauser to call it to handle the logic when the player leaves a specific type of tile
{
    ChangeNumber();
}
```

Essentially, each tile has a specific way it works. Icy tiles count down. Desert tiles count up. Lava tile decrease in number or increase. Each time the player leaves a specific tile , the Change Number method is called to handle the above functionality . When number of ice caps on the Icy tiles gets to zero, the icy tile destroys. Similarly , when the number of crops on desert tiles gets to 6, the desert tile destroys All the tiles are tagged as the layer mask "tile" while the obstacles are tagged as the layer mask "obstacle" so that the raycasting in the player controller works smoothly.

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Player Controller Logic :

```csharp
private IEnumerator MovePlayer(Vector3 direction)
{
    Vector3 newPosition = transform.position + direction*0.6f;

    RaycastHit2D obsHit = Physics2D.Raycast(newPosition, direction, 0.8f, obstacles); // here im using raycast to check if the obstcale we abut to move to exists or does not exists. Checking for the obstcle
    RaycastHit2D tileHit = Physics2D.Raycast(newPosition, direction, 0.8f,tiles); // here im using raycast to check if the tile we abut to move to exists or has been destroyed. Then checking th tiles' acces

    if (obsHit.collider == null && tileHit.collider != null) // im ensuring that the player can move if there's no obstacle and the tile is accessible. if there is no obstacle + valid tile, it  means the pat
    {
        Debug.Log( tileHit.collider.name +   "the  raycast found the tile we about to moveee tooo");
        Tile tile = tileHit.collider.GetComponent<Tile>();

        if (tile != null && tile.IsAccessible())
        {

            secondLastTile = lastTile;
            lastTile = tile;

            isMoving = true;
            float elapsedTime = 0;
            origPos = transform.position;
            targetPos = origPos + direction;

            while (elapsedTime < timetoMove)
            {
                transform.position = Vector3.Lerp(origPos, targetPos, elapsedTime / timetoMove);
                elapsedTime += Time.deltaTime;
                yield return null;
            }

            transform.position = targetPos;
            isMoving = false;
            OnMoveMade?.Invoke();

            if (tile!=currentTile)
            {
                currentTile.OnPlayerLeave();
                treeCounter++; // just a placeholder to show how the burning of trees increases the GHGs, which in turn melts ice caps amd thus increases the seal level beloow
                RectTransform markerRect = seaLevelMarker.GetComponent<RectTransform>();
                markerRect.anchoredPosition += new Vector2(0, seaLevelIncreement); // making the marker go up by two bc the melting of each ice caps symbolizes the rise in the sea level
```
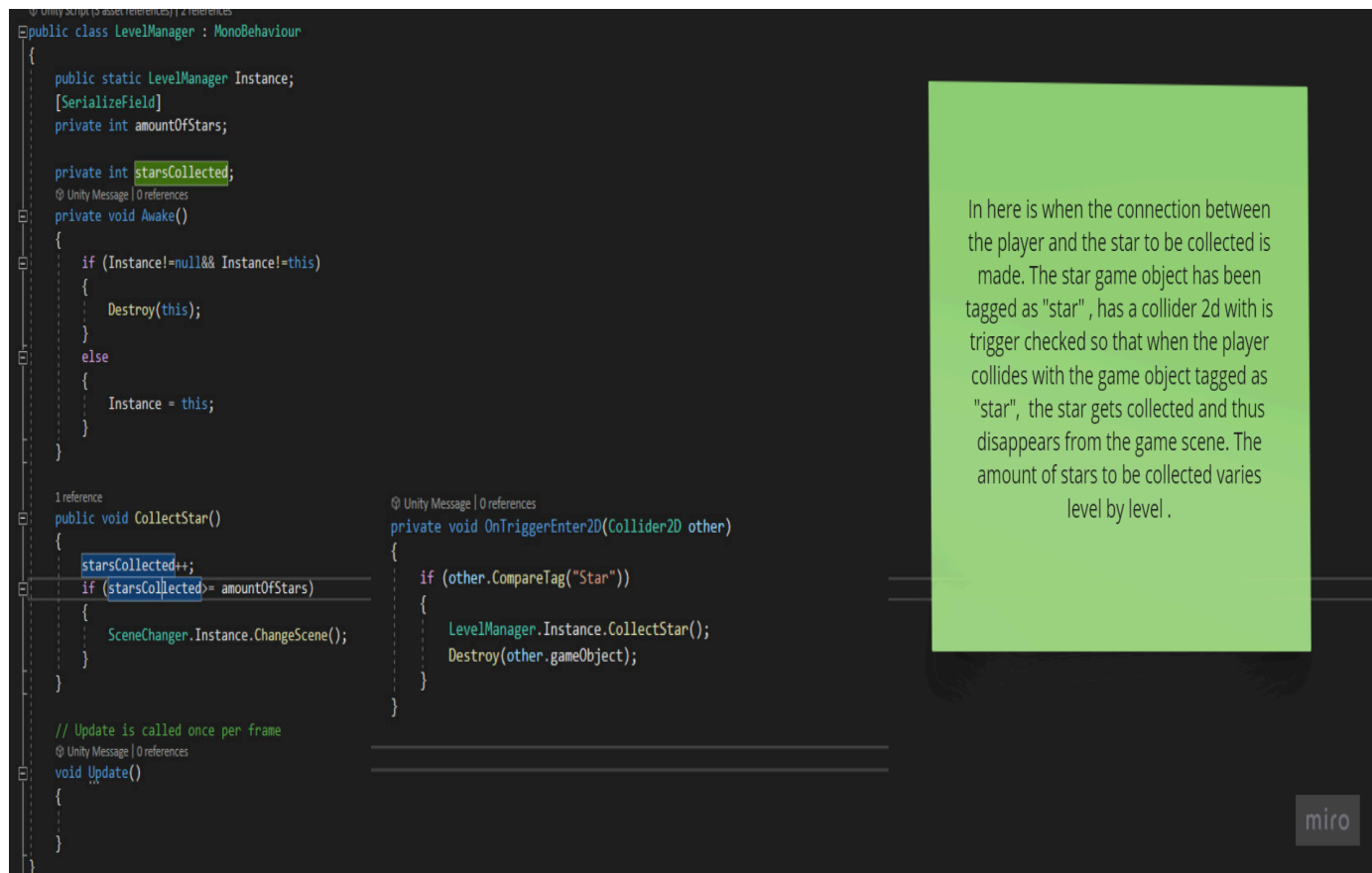
In here , the connection between the player movement and the tile logic is made. We used a physics raycast that checks if the player is moving into a tile that has obstacles or not as well what type of tile the player is moving into. If the tile the player is about to access does not have obstacles and the tile exists because it has been found by the raycast , we allow the player to move to it. If not , then the player cannot move there. If the current tile is the tile that the player has just left , we call the on player leave method from the Tile Logic script to handle the tile functionality as explained in the Tile logic picture above.

Star Collection Logic :


```
Unity Script [5 asset references] | 2 references
public class LevelManager : MonoBehaviour
{
    public static LevelManager Instance;
    [SerializeField]
    private int amountOfStars;

    private int starsCollected;
    Unity Message | 0 references
    private void Awake()
    {
        if (Instance!=null&& Instance!=this)
        {
            Destroy(this);
        }
        else
        {
            Instance = this;
        }
    }

    1 reference
    public void CollectStar()
    {
        starsCollected++;
        if (starsCollected>= amountOfStars)
        {
            SceneChanger.Instance.ChangeScene();
        }
    }

    // Update is called once per frame
    Unity Message | 0 references
    void Update()
    {

    }
}
```

```
Unity Message | 0 references
private void OnTriggerEnter2D(Collider2D other)
{
    if (other.CompareTag("Star"))
    {
        LevelManager.Instance.CollectStar();
        Destroy(other.gameObject);
    }
}
```

In here is when the connection between the player and the star to be collected is made. The star game object has been tagged as "star" , has a collider 2d with is trigger checked so that when the player collides with the game object tagged as "star", the star gets collected and thus disappears from the game scene. The amount of stars to be collected varies level by level .

Summary of Design Decisons made and changes recorded:

From the onset in our second group meeting , we decided to keep to the core mechanics of the original game as possible. This explains why the logics above adhere strictly to the overall gameplay in the original game. The reason why we decided on this design decision is because we wanted to ensure that our clone keeps to the original as far as gameplay is concerned.

Deciding on incorporating an educational aspect into the game is one of the key desig decisions that we made that make the clone feel and play differently from the original game. This is

because by adding a "personal" educational touch to the game, not only does the clone stand out because it has a different thematic focus, it also allowed us as designers to also learn about how to incorporate educational themes in gameplay and the overall impact that they could have on the gameplay experience that players derive from the game.

By adding immersive sound effects and animations, we enhanced the gameplay experience while teaching players about the importance of human responsibility. Our design decisions enabled us to learn about incorporating educational themes into gameplay, making our clone stand out from the original game while promoting a valuable message.

Reflection:

Moments of weakness within the design choice of including an educational theme in the game:

While our educational point comes through because players can see the direct impact of their moves on the overall ecosystem as well as the environment, it would've been very interesting to use the impact caused by the player to in turn affect player progression in the game. For example, if the impact of melting ice caps was the increase or rise in the sea level , if the sea level reached a certain range , that impact would've opened up an interesting gameplay challenge if it were to directly affect what the player could also do in their quest to getting to the star. In the same train of thought , if the land dryness meter reached a certain level of dryness or drought , bringing that impact into affecting the player directly in their gameplay either through limited moves or the idea of being stuck would've also expanded the gameplay challenges apart from the puzzle solving. That in turn would've made the

overall thematic point of the game even more compelling and thus even more strong in making players aware of the consequences of their actions in real life but also within gameplay.

At the moment the game only goes as far as making the player aware of the impact of their actions . That is, making aware them aware of how the rise in sea levels occurs or how droughts or volcanic activity occurs and how human beings contribute to that. However , making people or players aware of their impact is not compelling enough if they cannot try to find ways to combat issues of climate change droughts and global warming. If the players could think about how to use their movements in ways that combat or decreases the rise in sea levels or the levels of droughts , that would've opened an interesting gameplay opportunity because they see what is wrong about their actions and in turn try to fix or make them right.

Playtest reports and overall feedback:

For our build session, we conducted a playtest based on the first 4 levels of the game we had at the time. The questions were based on a few categories around difficult, length complications the players noticed and player progression throughout the game.

How did the difficulty of the first four levels feel? Did it ramp up smoothly or were there any noticeable spikes?

From the feedback from the play testers, they believed that the overall mechanics ad difficulty of the game, progressed at a

reasonable pace. The game in the end became challenging but overall the pace was reasonable for players

Were the obstacles or puzzles in the levels engaging? Were any too easy or frustratingly hard?

The play testers believed that the levels were engaging, and they did not feel bored at all throughout the game. It ranged from easy to difficult.

Did any of the levels feel too long or too short?

Some play testers really struggled with the last level which took them long, but others contradicted that thought and though the levels were at a good pace.

Did you feel compelled to keep progressing through the levels? What kept you motivated or what made you want to stop?

All play testers felt compelled to progress through each level, most felt that the accomplishment of beating each level gave them motivation as well as the nature to complete each level.

Did you encounter any bugs or glitches in these levels? If yes, please describe them.

A few bugs were found from play testers like a star in the middle of the ocean as well as some tiles not working, for example, the tiles would not change but overall, no one saw huge bugs.

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