Session Six:
Dynamic Sprites Creation

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Dynamic Sprite Creation

1 Dynamic Sprite Basics

Dynamic sprite creation means creating sprites at run time (during the game play).

1.1 How To Create a Sprite Dynamically

To create a sprite dynamically, we need a Sprite Prototype. The sprite prototype will be the basis sprite from which sprite copies are created. The sprite prototype is not handled and it is not displayed.

Example:
Type the following code in the ‘StarTrooperGame.cs’ file in order to create a sprite prototype:

```csharp
public static Fire Fire;
```

Under public override void InitializeResources() function, type:

```csharp
Picture fire01 = new Picture("fire01.bmp", Color.FromArgb(0, 255, 0));
Game.Add(fire01);
Picture fire02 = new Picture("fire02.bmp", Color.FromArgb(0, 255, 0));
Game.Add(fire02);
Frame affire01 = new Frame(fire01, 5);
Frame affire02 = new Frame(fire02, 5);
Animation fireAnimation = new Animation();
fireAnimation.Add(affire01);
fireAnimation.Add(affire02);
fireAnimation.Play();
fireAnimation.Loop = true;
Fire fire = new Fire();
fire.ZOrder = -10;
fire.Add(fireAnimation);
Fire = fire;
```

Note: The sprite fire is not added to the game, so it is not active.

After creating a prototype, create a copy of it. Then set the copy properties like position, velocity, etc. To create a copy of the prototype, type the following:

```csharp
Fire fire = (Fire)StarTrooperGame.Fire.Clone();
fire.Position = new PointF(Position.X, Position.Y – 35);
fire.Velocity = new Vector2(0, -4); // up direction, speed=4
Game.Add(fire);
```

1.2 When Are Dynamic Sprites Used?

Dynamic sprites are used when we need to create sprites and use them during the game play. For example, dynamic sprites are used to create bullets to shoot or a new life.
2 INPUT

2.1 Keyboard

A keyboard is a device that returns character codes, the American Standard Code for Information Interchange (ASCII). Since the computer machine can only understand binary numbers, numbers represent the character set. For example, the number 65 in base 10 (which is 01000001 in binary) represents uppercase character A.

2.2 Pressed

The action assigned to the keyboard input will be executed as long as the key is pressed. To get the status of a key (if it is pressed or not), call the `IsPressed()` function.

Example:
```
Keyboard.IsPressed(Key.UpArrow)
```

This function returns a Boolean value even TRUE (1) or FALSE (0).

2.3 Triggered

The action assigned to the keyboard input will be executed when the key status changes from not pressed to pressed. To get the status of a key (if it is triggered or not), call the `IsTriggered()` function.

Example:
```
Keyboard.IsTriggered(Key.Space)
```

This function returns a Boolean value even TRUE (1) or FALSE (0).

GAME IMPLEMENTATION

In the game, the arrow keys are used to move the main sprite (trooper sprite).
- Pressing the Up arrow moves the trooper upward.
- Pressing the Down arrow moves the trooper downward.
- Pressing the Left arrow moves the trooper to the left.
- Pressing the Right arrow moves the trooper to the right.

Also, when the Space key is triggered, then the main sprite (trooper) will shoot a bullet (fire sprite), which is a sprite created dynamically.

STEP 1: CREATE A PROTOTYPE

Use the steps noted above (1.1) to create your prototype (fire sprite for shooting).
**Step 2: Enter Input Information**

Type the following code in the ‘StarTrooperSprites.cs’ file – in the **Trooper** class under **public override void Update()** function:

```csharp
int vx = 0, vy = 0;
if (Position.Y > 50 && Keyboard.IsPressed(Key.UpArrow))
    vy = -2;  // if trooper is under y=50 then go upward
if (Position.Y < 450 && Keyboard.IsPressed(Key.DownArrow))
    vy = 2;   // if trooper is over y=450 then go upward
if (Position.X > 30 && Keyboard.IsPressed(Key.LeftArrow))
{
    vx = -2;  // go to the left
    ScaleX = -1; // left flip trooper
}
if (Position.X < 610 && Keyboard.IsPressed(Key.RightArrow))
{
    vx = 2;  // go to the right
    ScaleX = 1; // right flip trooper
}
Velocity = new Vector2(vx, vy);    // set new velocity for Trooper

// if space bar is triggered
if (Keyboard.IsTriggered(Key.Space))
{
    // dynamically create a new sprite
    Fire fire = (Fire)StarTrooper.Fire.Clone();
    fire.Position = new PointF(Position.X, Position.Y - 35);
    fire.Velocity = new Vector2(0, -4);
    Game.Add(fire);    // set the fire sprite active
}
```