

Software Design of Tempest 3D

This document covers the overall software design- including data structures, finite state machines, pseudo-code algorithms for the graphics, AI, sound, and main game engine of Tempest 3D.

Data Structures:

The data structures contained information about each game play element.

1. Player ship:

Health, Velocity, Position, Rotation, Size, Explosion Data, Lives, Powerup Type, Ammo

2. Enemies:

Health, Position, Rotation, Size, Explosion Data

3. Powerups:

Type, Position

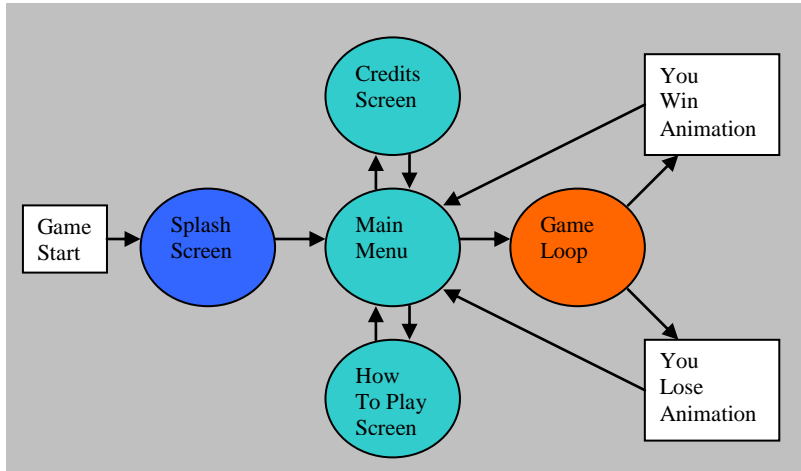
4. Obstacles:

Position, Rotation

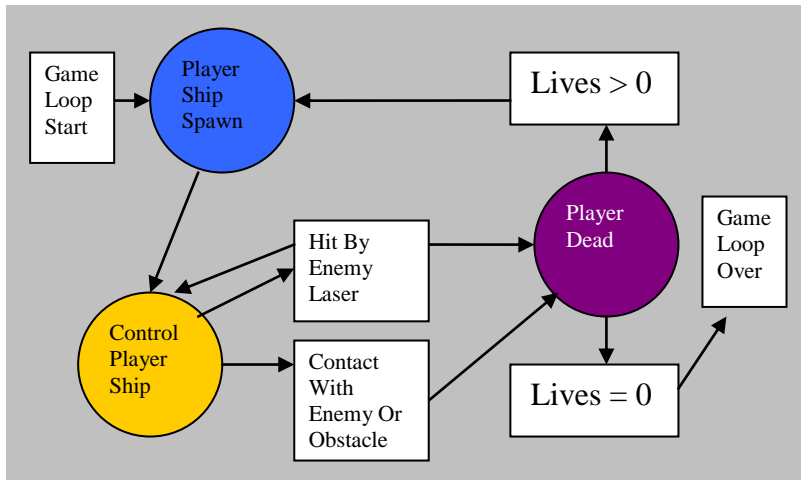
Finite State Machines:

Finite state machines describe the flow of control for game play elements.

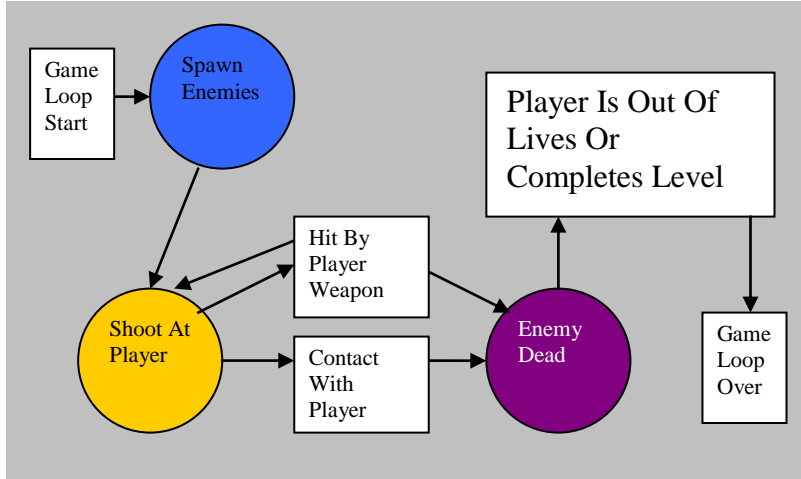
1. Game play:



2. Player ship:



3. Enemies:



Pseudo-code algorithms:

Pseudo-code algorithms describe coding techniques used to implement game play elements.

1. Main Game Engine:

Game Start:

- Spawn Player At Start Point
- Step Through Enemy Spawn Points and Spawn an Enemy at Each One

Game Play:

```
If(Player presses left or right)
{
    Move ship left or right
}

If(Player presses main weapon button)
{
    Shoot Laser
}

If(Player touches powerup)
{
    If(Powerup Type = Health Pack)
    {
        Health = Full
    }
    Else If(Powerup Type = Weapon Type)
    {
```

```

        Display Powerup In HUD
        Ammo = 3
    }
    Else //Powerup is Invincibility
    {
        Make Player Invincible for Short Time
    }
}

If(Player presses secondary weapon button AND ammo > 0)
{
    Fire secondary weapon
    Ammo = Ammo - 1
    If(Ammo = 0)
    {
        Remove powerup image from HUD
    }
}

If(Player runs into obstacle or enemy)
{
    Blow up

    If(Lives = 0)
    {
        GAME OVER
    }
    Else
    {
        Lives = Lives - 1
        Respawn
    }
}

If(Player hit by enemy laser)
{
    Health = Health - Ammount
    If(Health = 0)
    {
        Blow up

        If(Lives = 0)
        {
            GAME OVER
        }
        Else
        {

```

```

        Lives = Lives - 1
        Respawn
    }
}

If(Enemy hit by player weapon)
{
    Enemy blow up
}

If(End of tunnel reached)
{
    GAME OVER
}

```

Game Over:

```

If(Player reached end of tunnel)
{
    Display you win screen
}
Else //Player ran out of lives
{
    Display you lose screen
}
Return control to main menu screen

```

2. Sound:

```

If (Main Menu Screen, How To Play Screen, Credits Screen Displayed)
{
    Play Main Menu Music
}
Else If>Loading Screen Displayed)
{
    Play Loading Screen Music
}
Else If>Inside Main Game Loop)
{
    Play Main Game Music
}
Else //Game just started and splash screen is being displayed
{
    Don't play music
}

If(Laser fired)
{

```

```
        Play laser sound
    }

    If(Secondary weapon fired)
    {
        Play Secondary weapon sound
    }

    If(Enemy laser fired)
    {
        Play enemy laser sound
    }

    If(player or enemy destroyed)
    {
        Play explosion sound
    }

    If(powerup picked up)
    {
        Play powerup sound
    }

    If(player invincible)
    {
        Play invincible song
    }

    If(Checkpoint reached)
    {
        Play checkpoint sound
    }
```

3. Graphics:

```
Game Start:
    Display Player Ship
    Display Tunnel
    Display Enemies
    Display HUD image
    Display Full Health Bar

    If(player health changes)
```

```
{
    Display new health amount
    If Health Pack
}

If(New Weapon Powerup OR Secondary Weapon Used)
{
    Change display for weapon type and ammo
}

If(player dies)
{
    Change lives count
}

If(player invincible)
{
    Display invincible effect
}

If(Health powerup picked up)
{
    Display health restored effect
}

If(Player out of Lives)
{
    Display You Lose Screen
}

If(Player reaches end of tunnel)
{
    Display You Win Screen
}
```