

A decorative graphic on the left side of the slide, consisting of a series of vertical and diagonal lines of varying thicknesses, some ending in small circles, resembling a stylized circuit board or a tree structure.

Tower Defense

About Hackathon & MiniProject2 & Qusetions

- Take a game as the theme(Plants vs. Zombies). We complete **in stages**.
- Package: You get a package with bugs and incompleteness.
- Hackathon: Fix the bugs and incompleteness.
- MiniProject2: Add new features related to the theme of the game (EX:the turret is destroyed).
- Qusetions : Please fully understand this package, because you will be asked some questions in the demo of the MiniProject2.

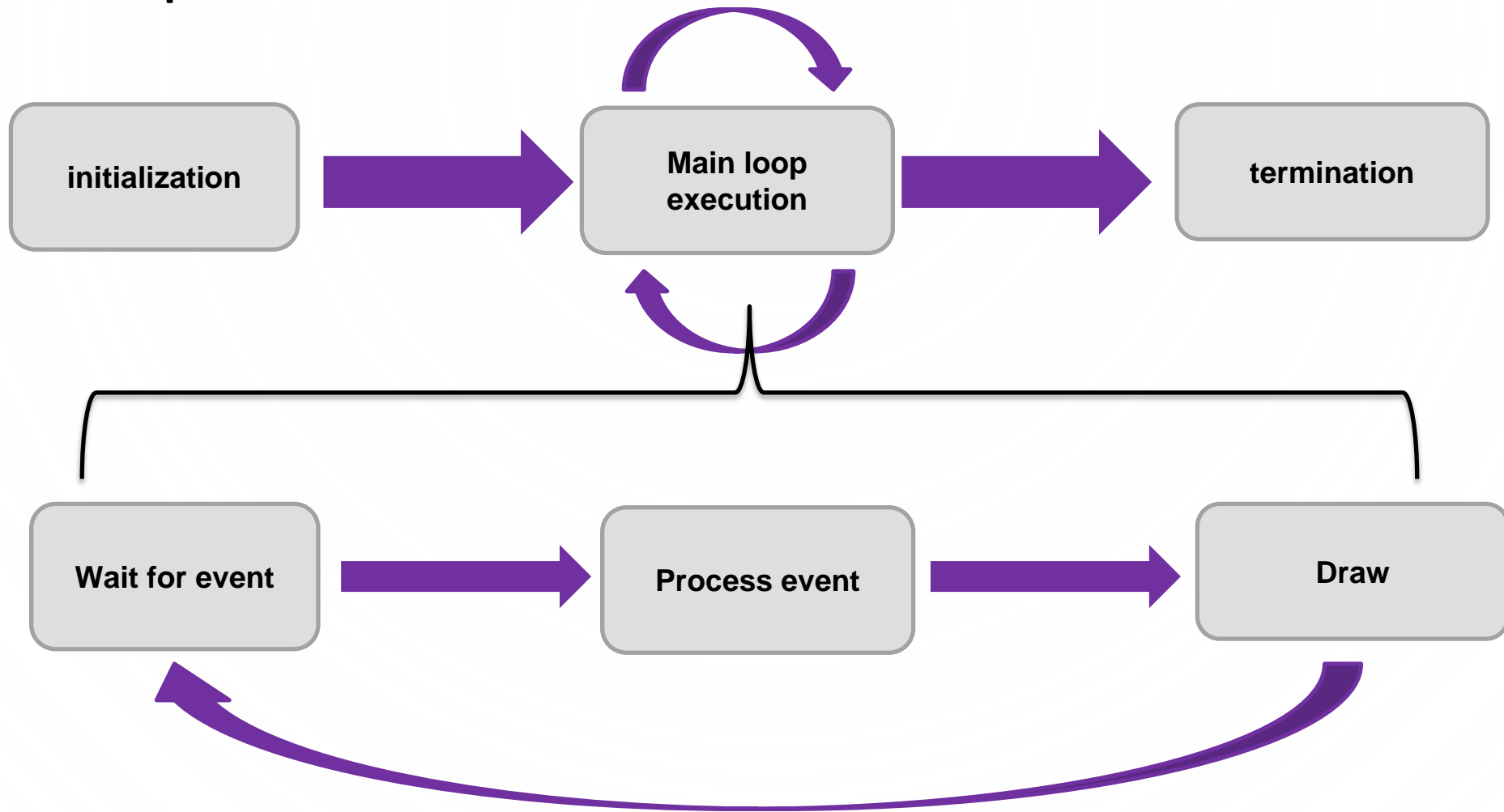
Outline

- Allegro5 game development process
- Template
 - Condition-StartScene
 - Condition-StartScene-label
 - Condition-StartScene-ImageButton
 - Condition-StartScene-lscene
 - Condition-Scene-Extension
- Game code

Outline

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Main process:



Core process:



It mainly consists of two parts.

1. Event → keyboard , mouse , timer...etc
2. Draw → object painting

Simple Code

```
int main()
{
    int error=0;

    error=game_init();
    if(error!=0)return error;

    error=game_run();
    if(error!=0)return error;

    error=game_destory();
    if(error!=0)return error;

    return 0;
}
```

```
int game_msg(){

    al_wait_for_event(queue,&my_event);
    switch (my_event.keyboard.keycode) {
        case ALLEGRO_KEY_DOWN:
            direction = 0;
            break;
        case ALLEGRO_KEY_UP:
            direction = 1;
            break;
        case ALLEGRO_KEY_LEFT:
            direction = 2;
            break;
        case ALLEGRO_KEY_RIGHT:
            direction = 3;
            break;
        default:
            break;
    }
    return 0;
}
```

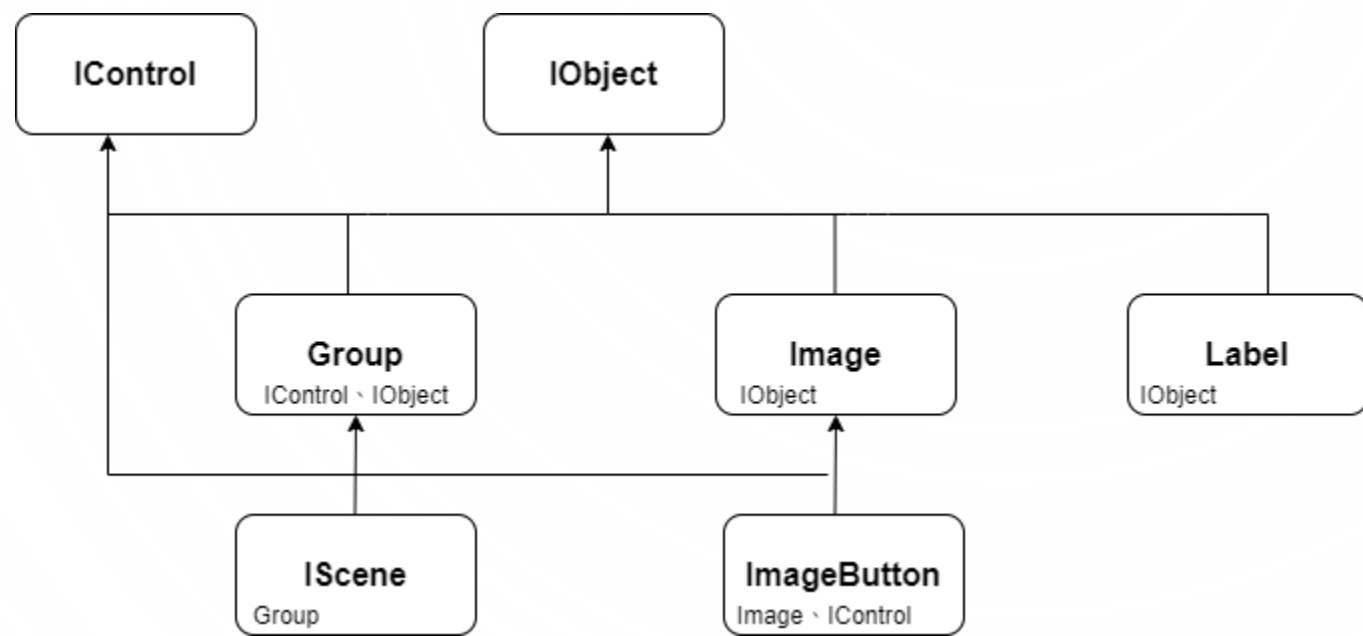
```
int game_render(){
    //用指定的颜色填充屏幕
    al_clear_to_color(al_map_rgb(0,0,0));
    al_draw_tinted_scaled_rotated_bitmap(bmp, al_map_rgba(255, 255, 255, 255), 32, 32,
                                         x, y, 1,1, 0, 0);
    al_flip_display();
    return 0;
}
```



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Core



GameEngine

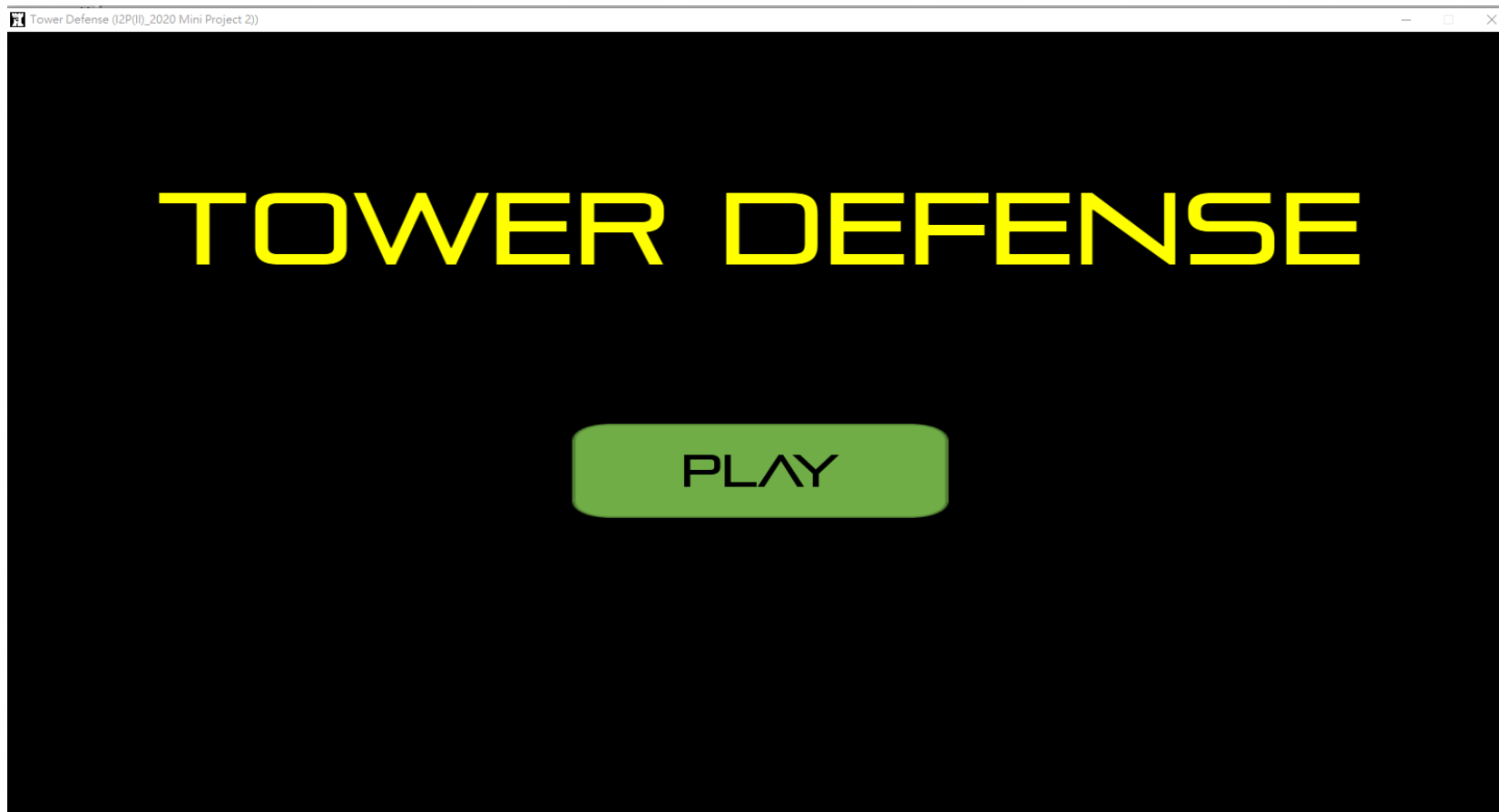
Resources

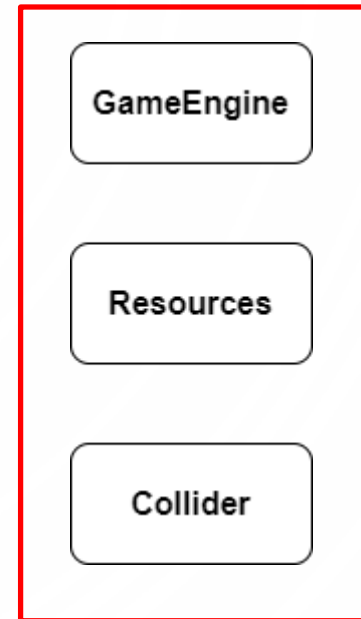
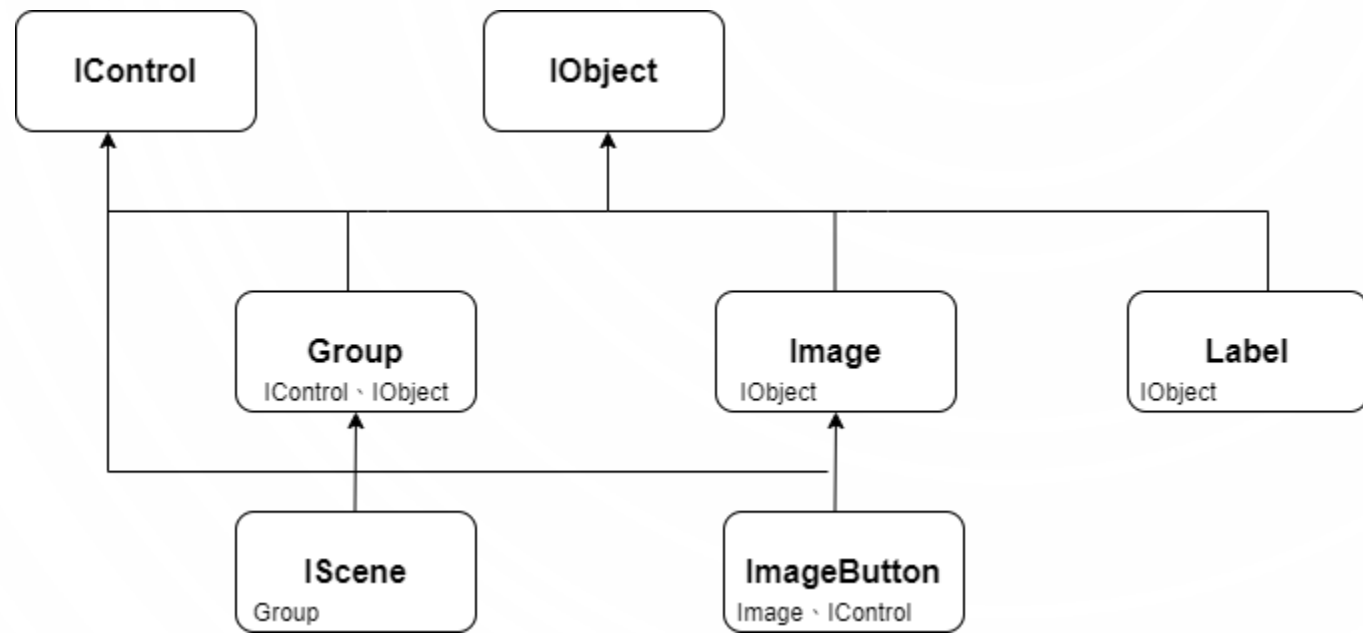
Collider

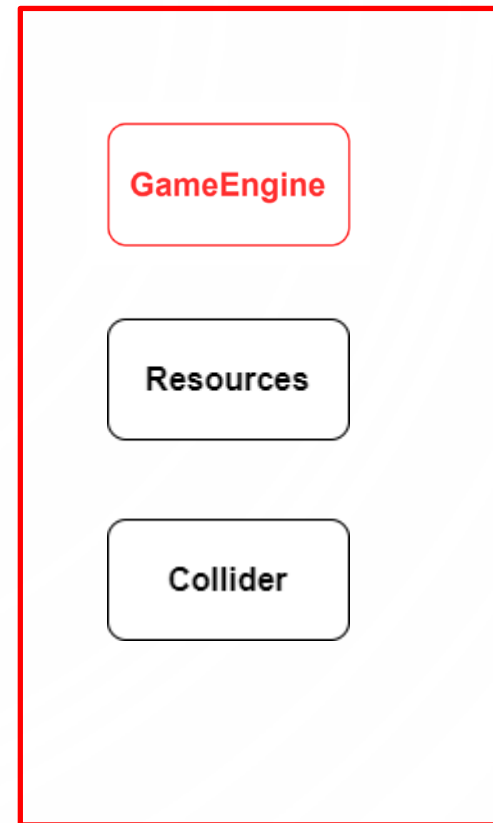
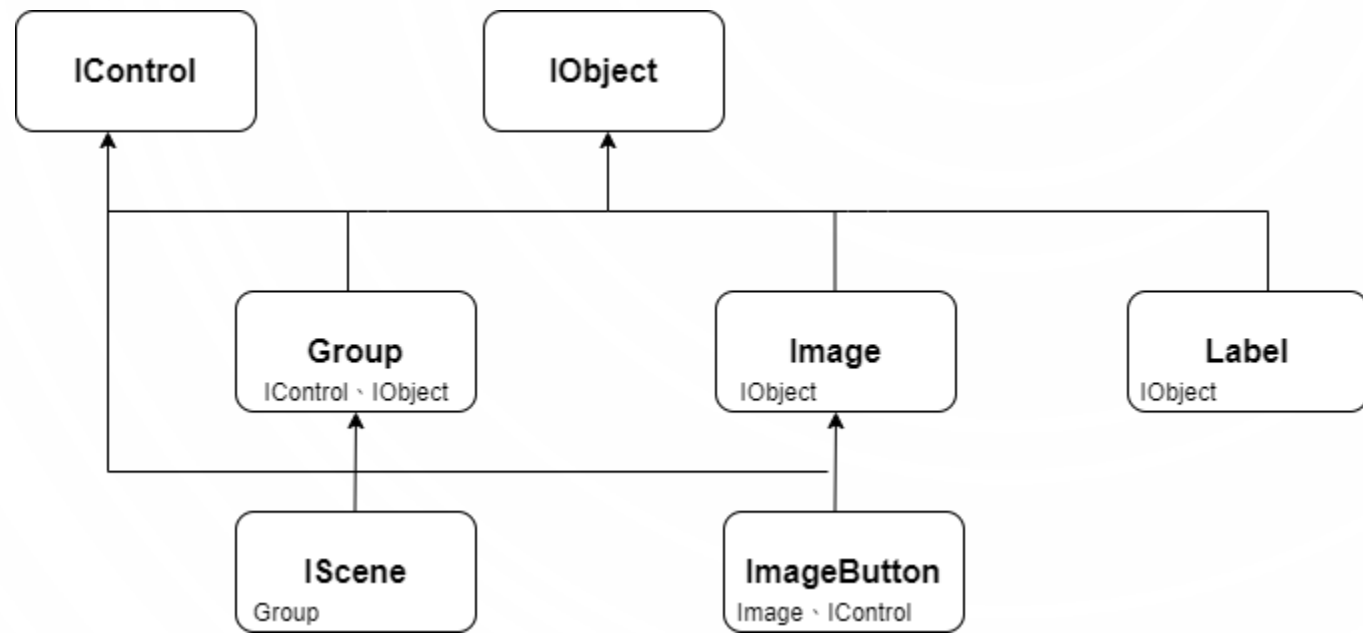
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Condition -StartScene

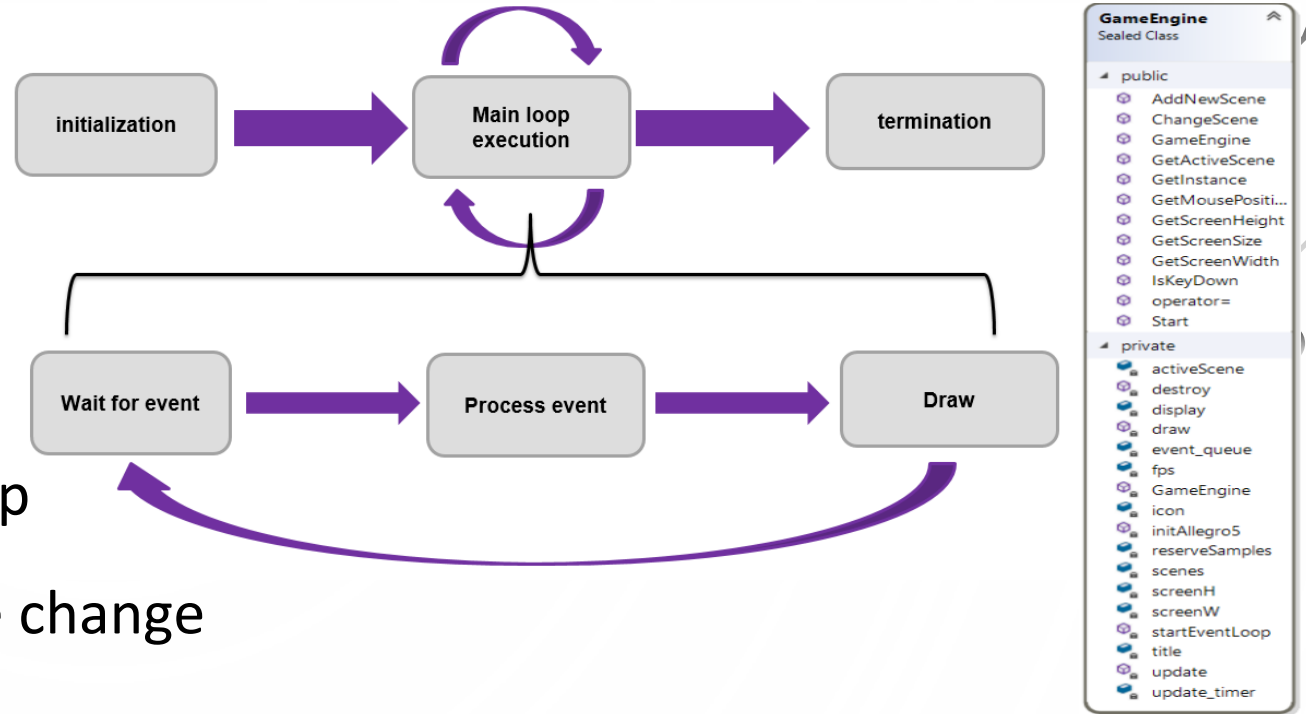






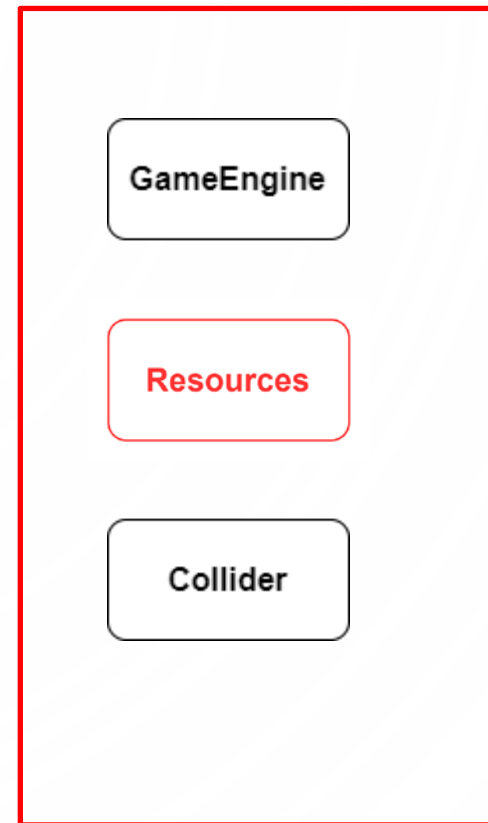
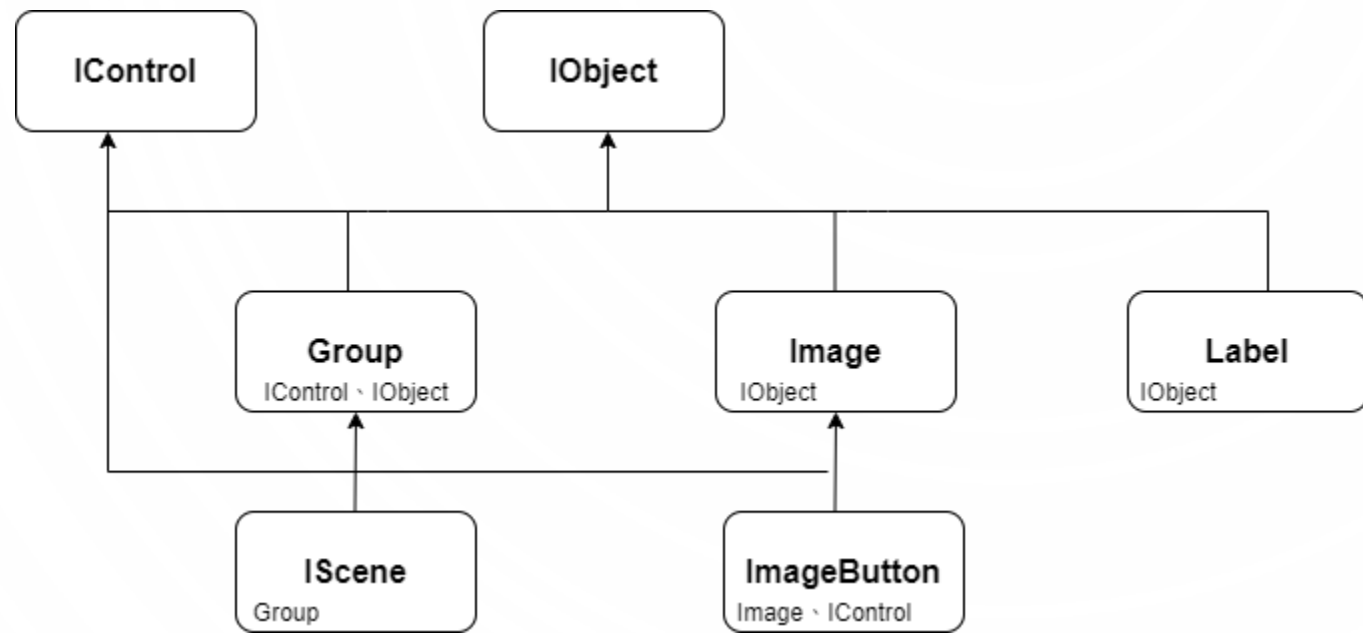
GameEngine

- Abstracts the entire message loop
- Manage current scene and scene change



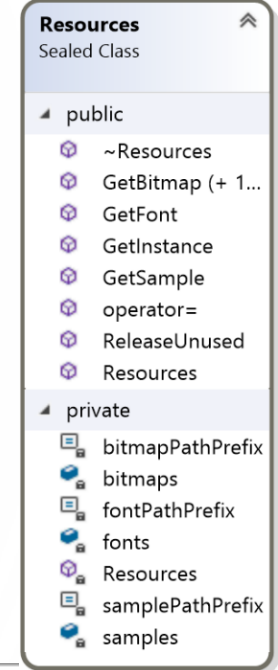
```
C:\Users\user\Desktop\c++專案助教\mini project 2\TowerDefense\Debug\TowerDefense.exe
[INFO] Game Initializing...
[INFO] Loaded Resource<image>: resources/images/icon.png
[INFO] Loaded window icon from: icon.png
[INFO] There are total 8 supported mouse buttons
[INFO] Allegro5 initialized
[INFO] Game begin
[INFO] Loaded Resource<image>: resources/images/start_scene/out.png scaled to 400x100
[INFO] Loaded Resource<image>: resources/images/start_scene/out.png
[INFO] Loaded Resource<image>: resources/images/start_scene/in.png
[INFO] Loaded Resource<font>: resources/fonts/pirulen.ttf with size 48
[INFO] Loaded Resource<font>: resources/fonts/pirulen.ttf with size 108
[INFO] Game initialized
[INFO] Game start event loop
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] draw
```





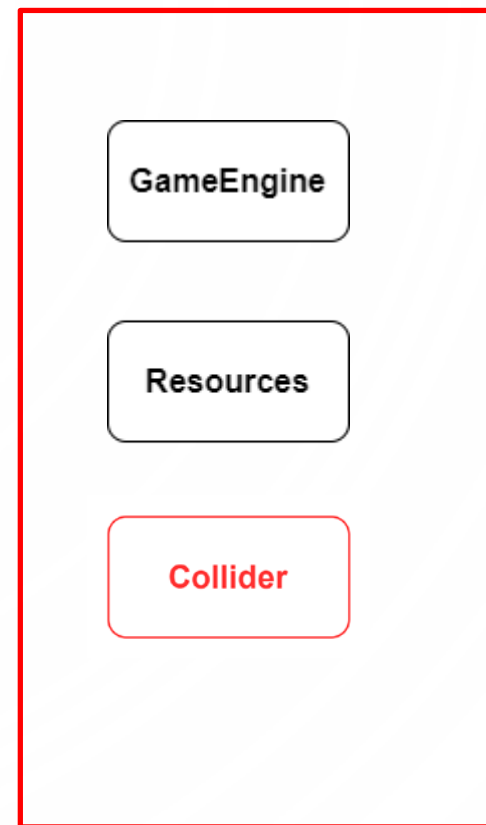
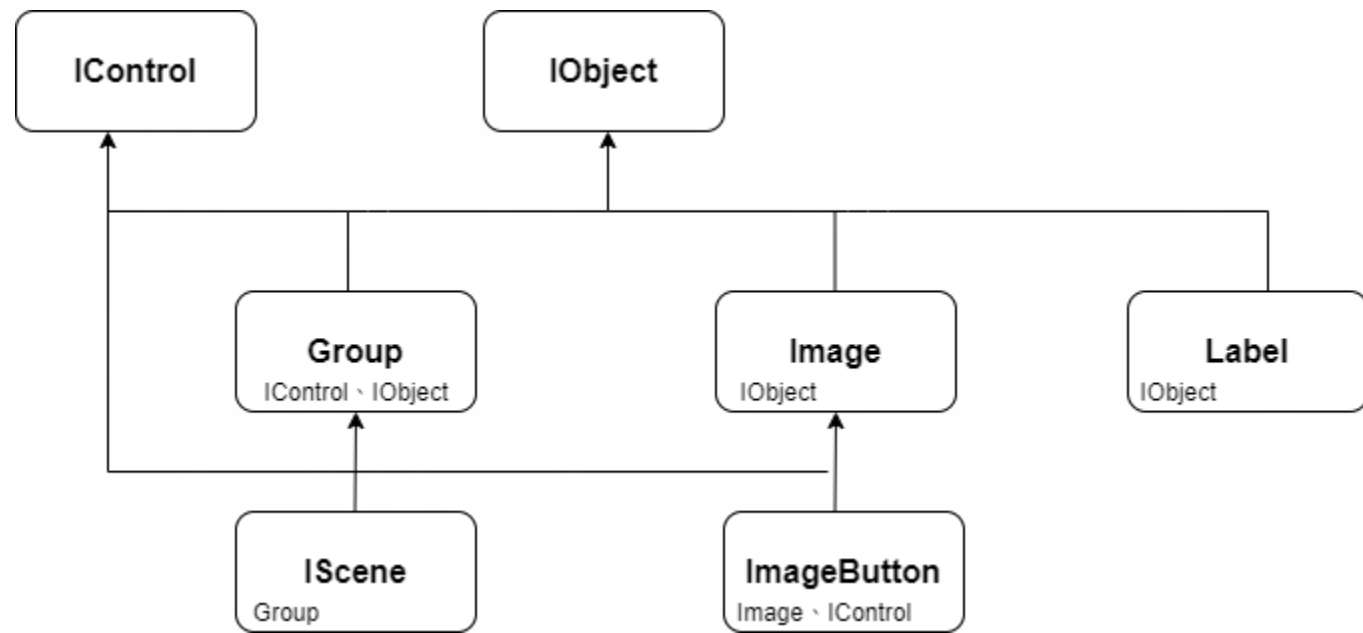
Resources

- Abstracts all resources loading and destroy.
- Resources can be retrieved from this class directly



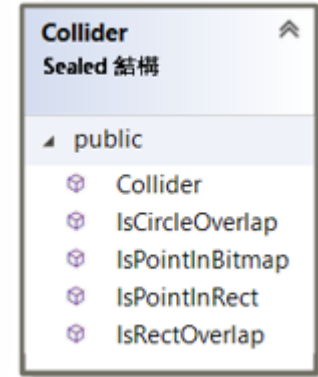
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[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] Timer event
[INFO] draw
[INFO] This must
```





Collider(struct)

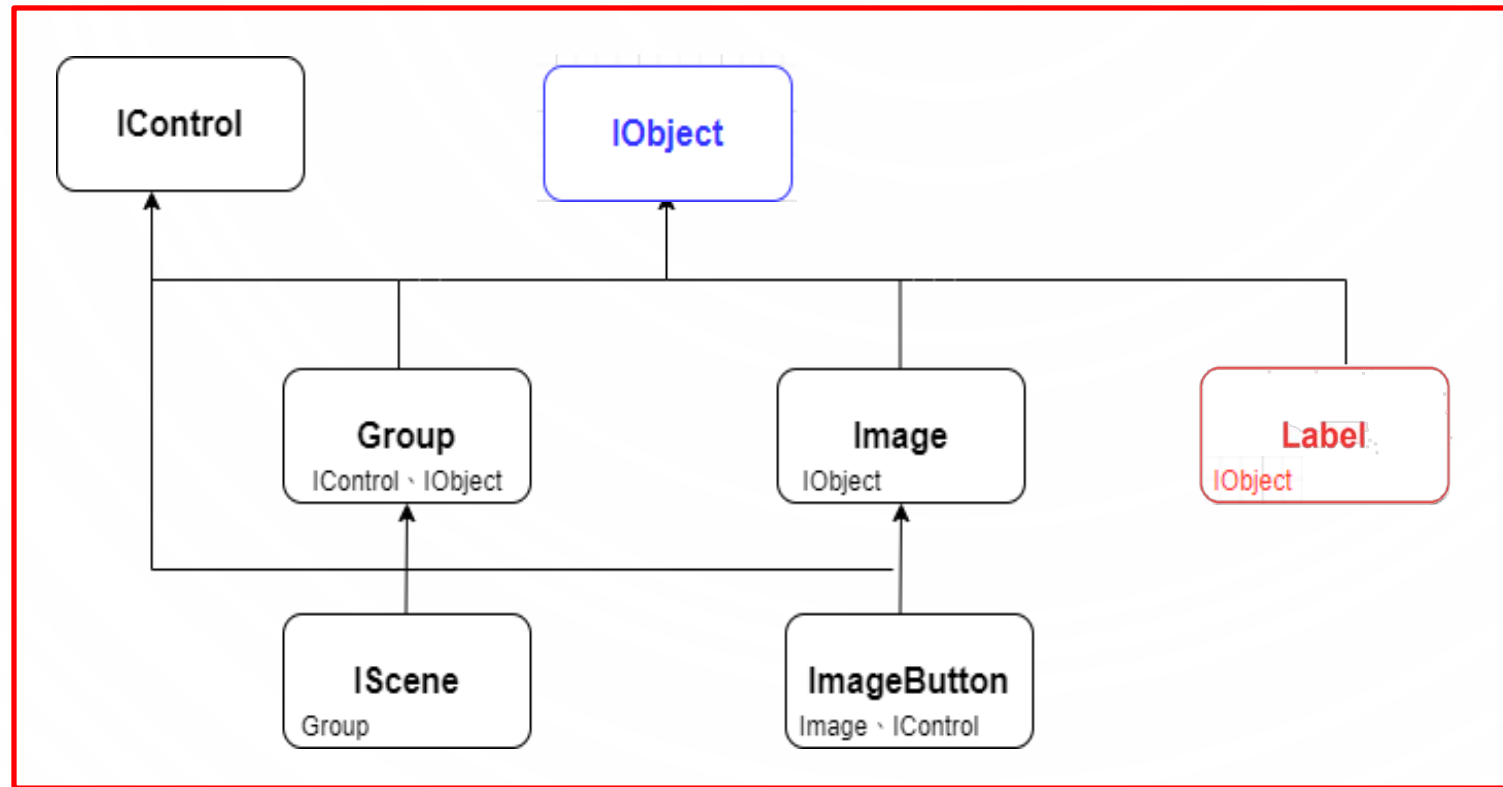
- calculating physical collision, overlap, point in region.



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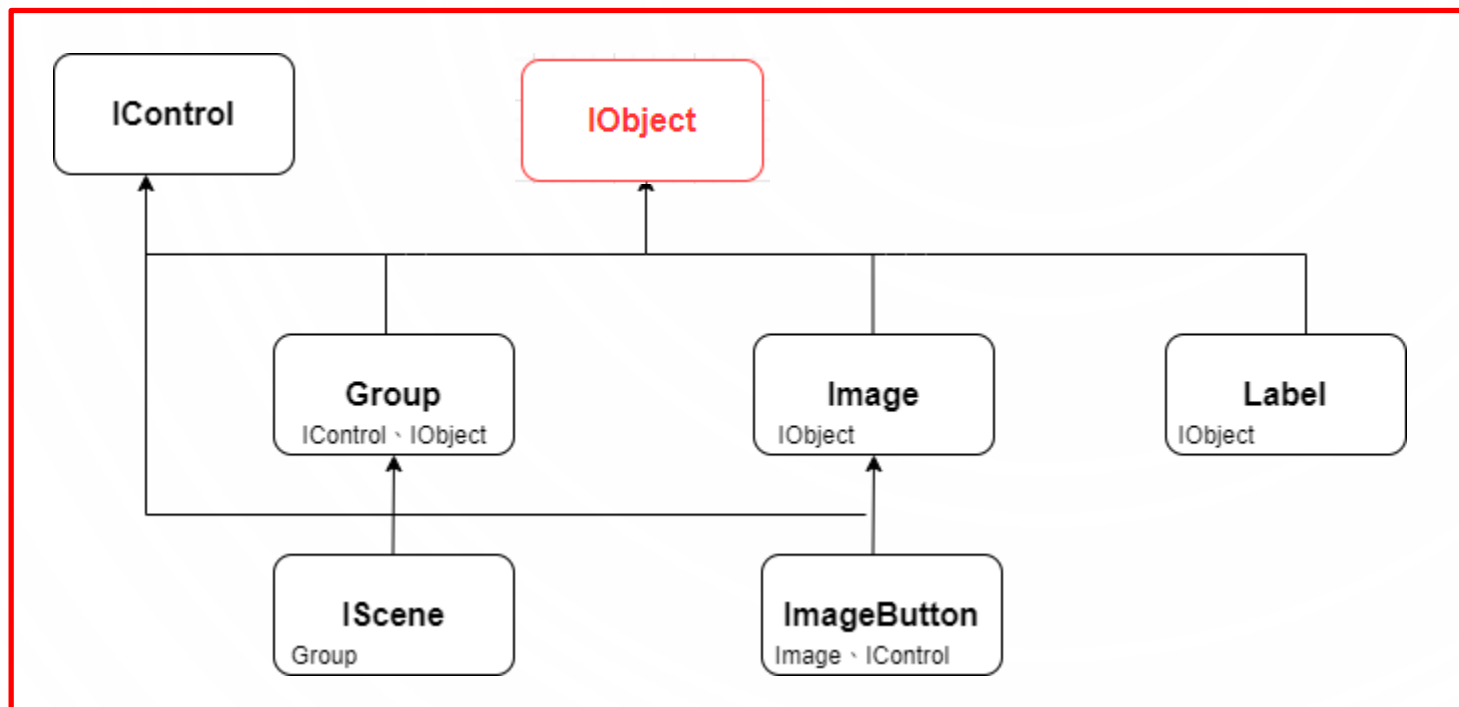
Condition –StartScene-label



GameEngine

Resources

Collider



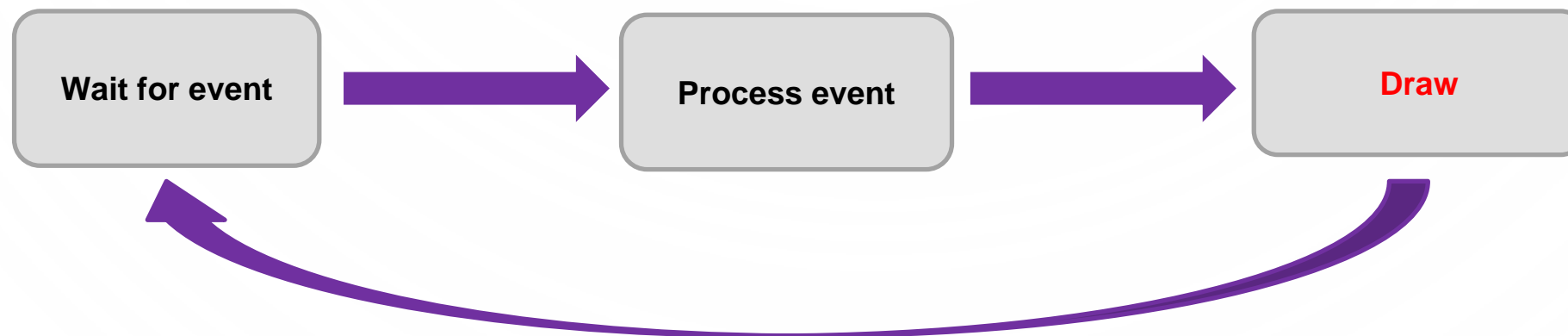
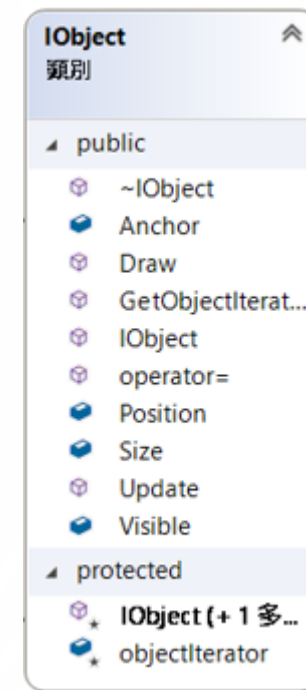
GameEngine

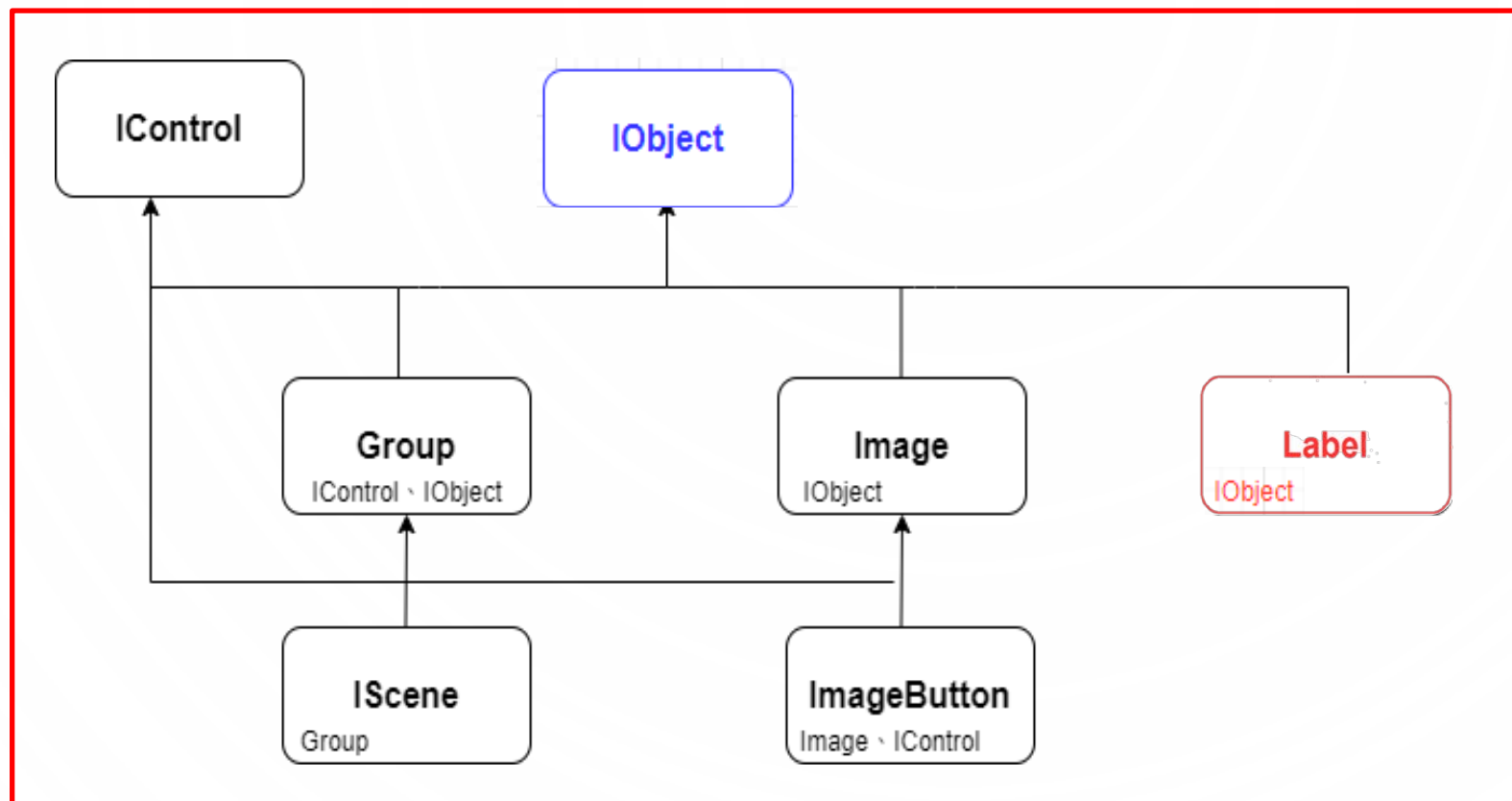
Resources

Collider

IObject

- The base class of everything that can be drawn
- Main definition of **Draw** and **Update**





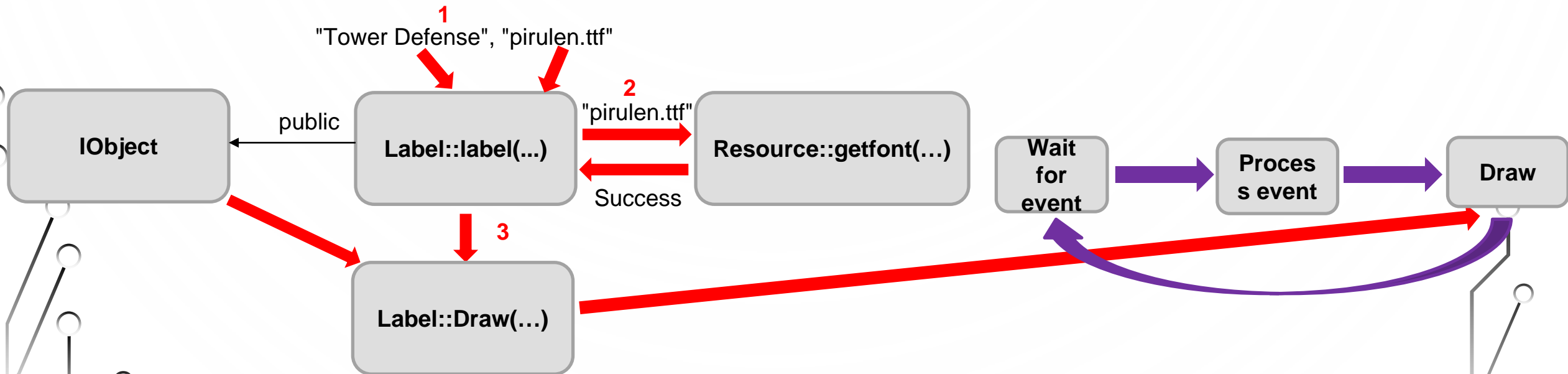
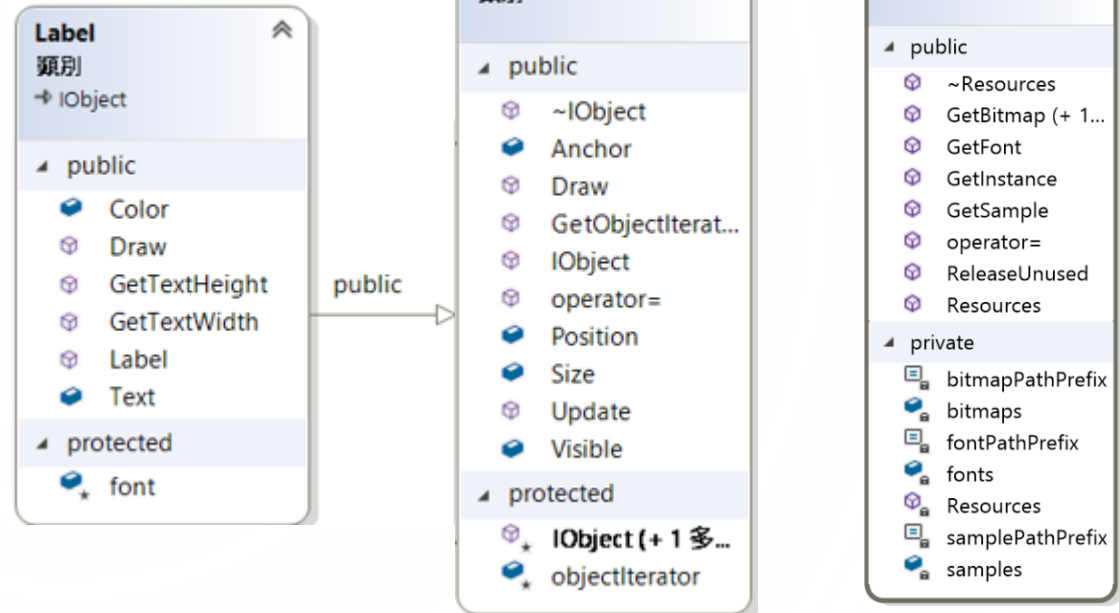
GameEngine

Resources

Collider

Label

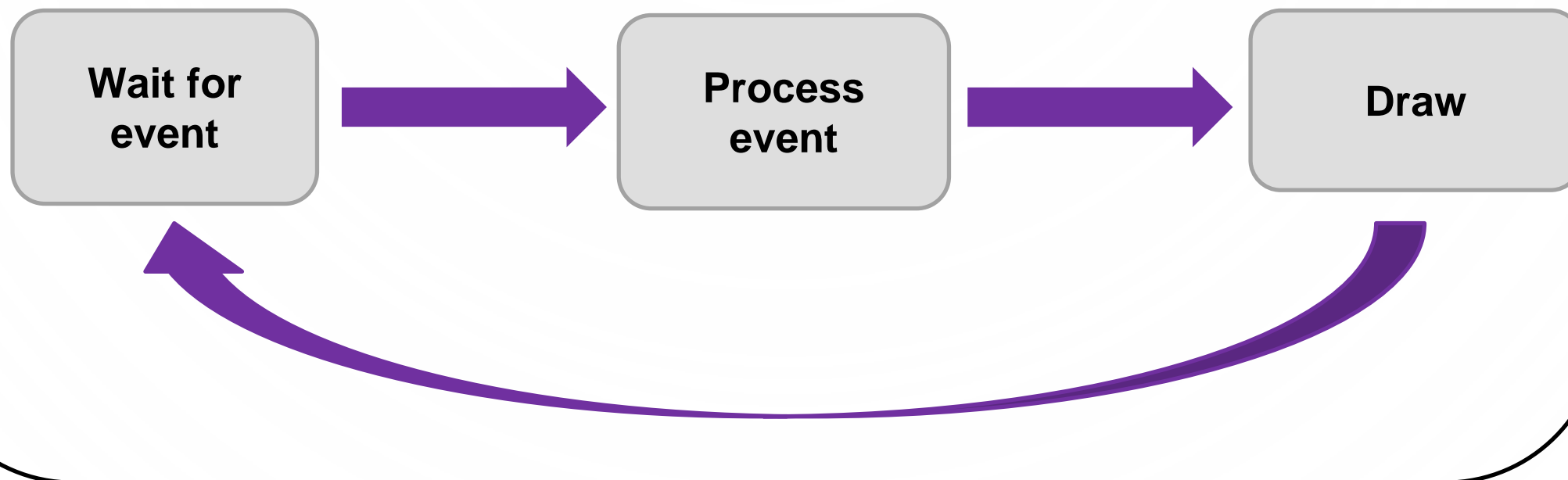
- public Engine::IObject
- A simple static text object.



GameEngine



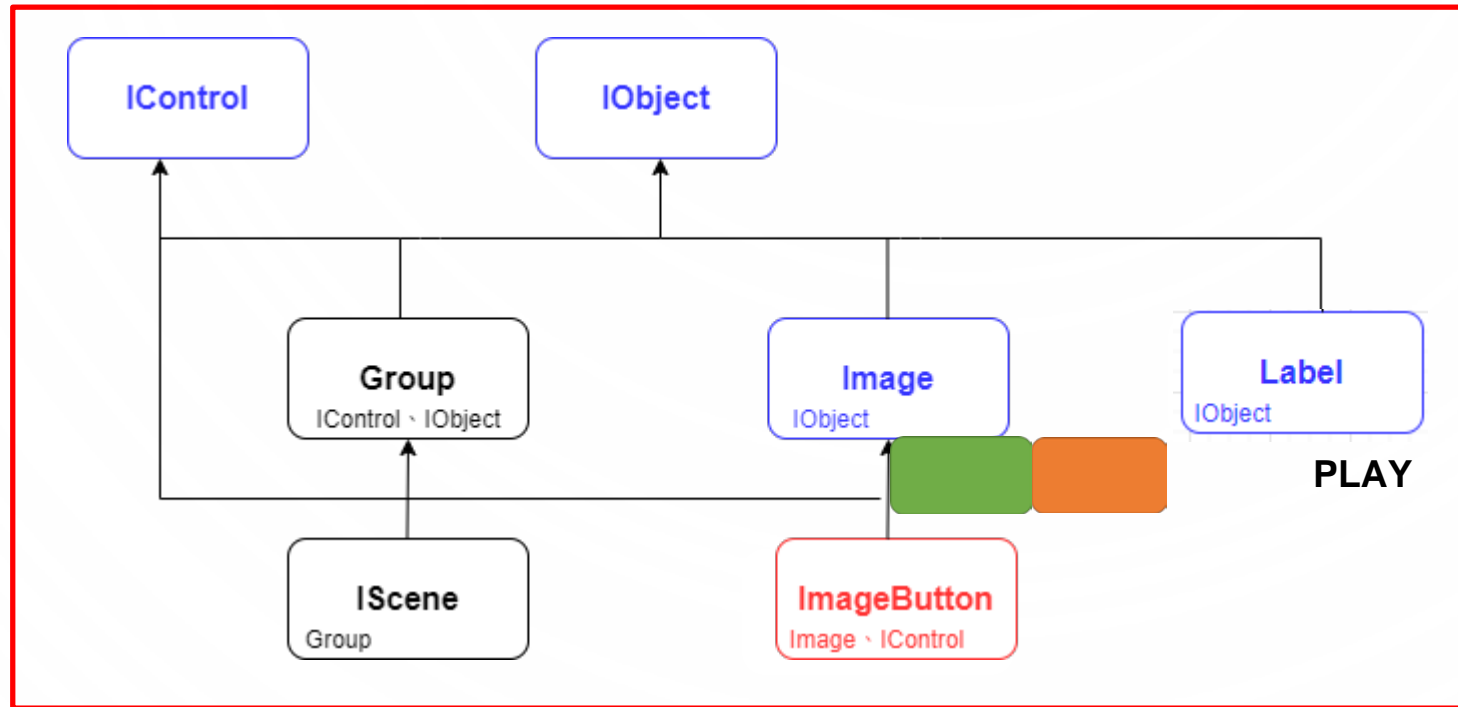
Label(Tower defense)



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Condition –StartScene-ImageButton



TOWER DEFENSE

PLAY

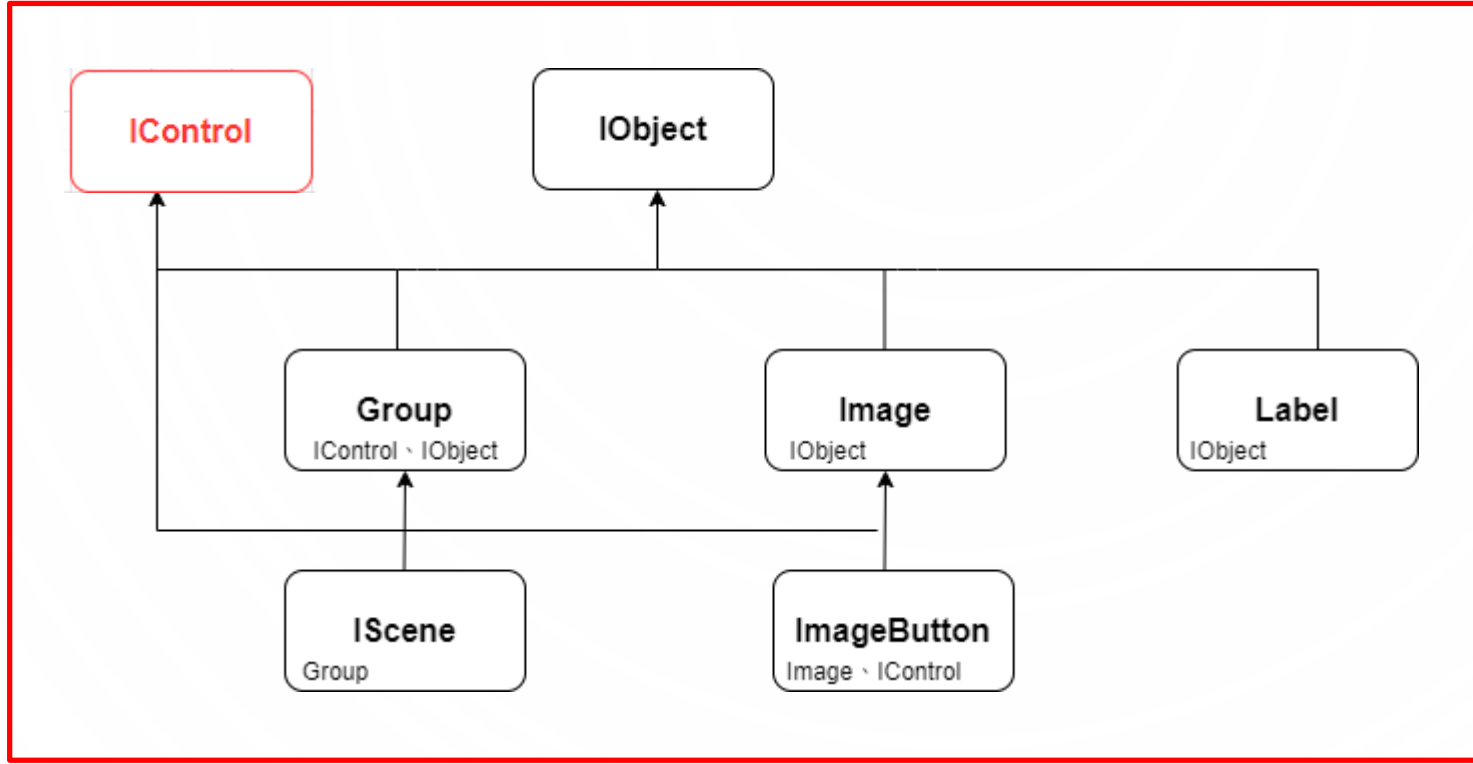
TOWER DEFENSE

PLAY

GameEngine

Resources

Collider



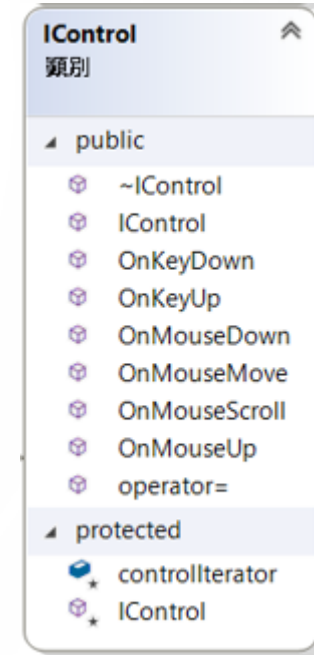
GameEngine

Resources

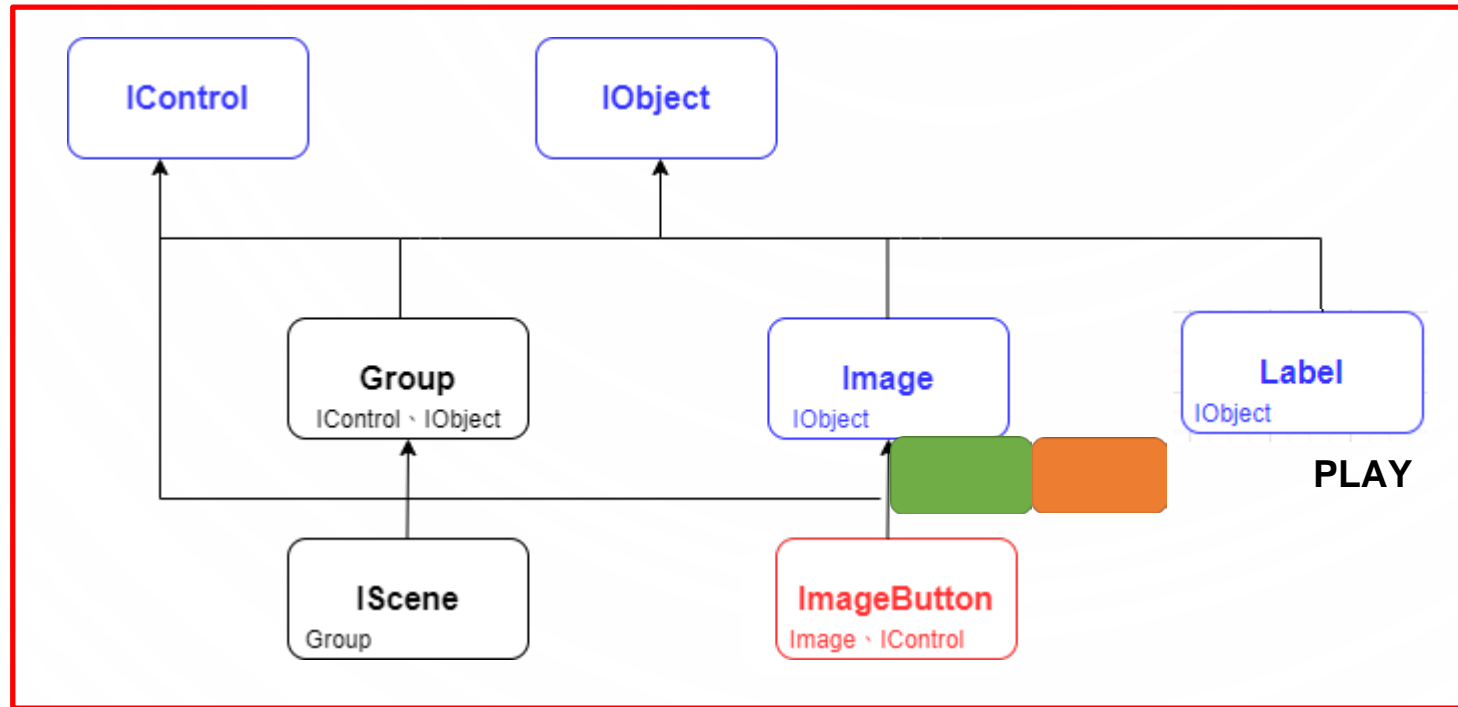
Collider

IControl

- The base class of everything that can receive events



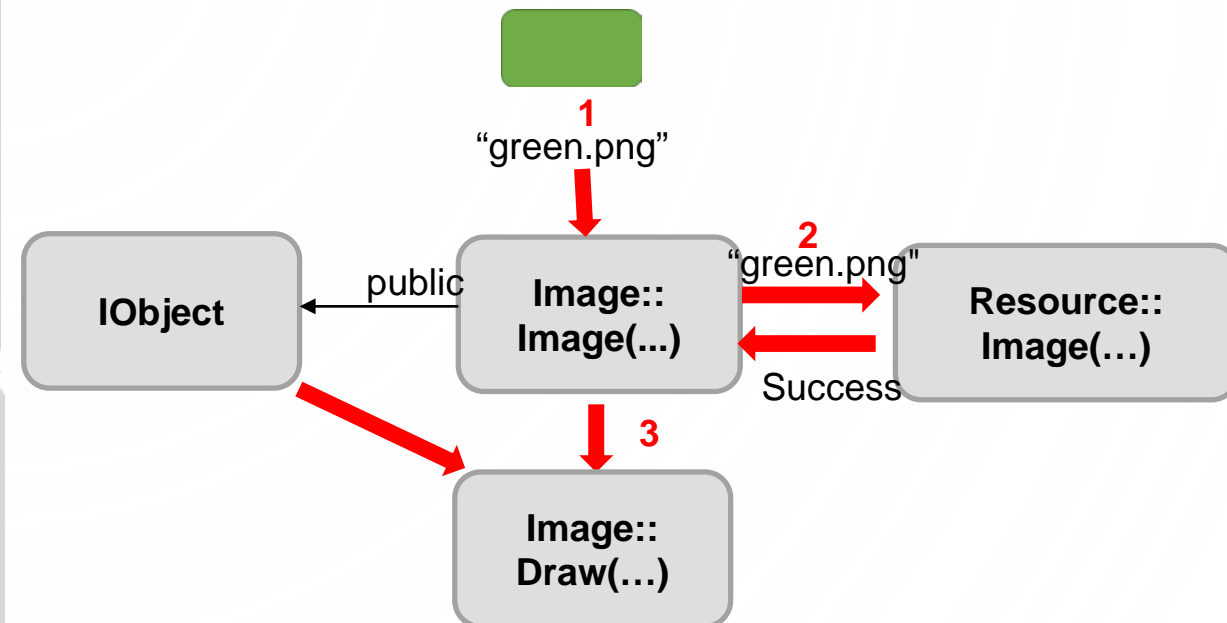
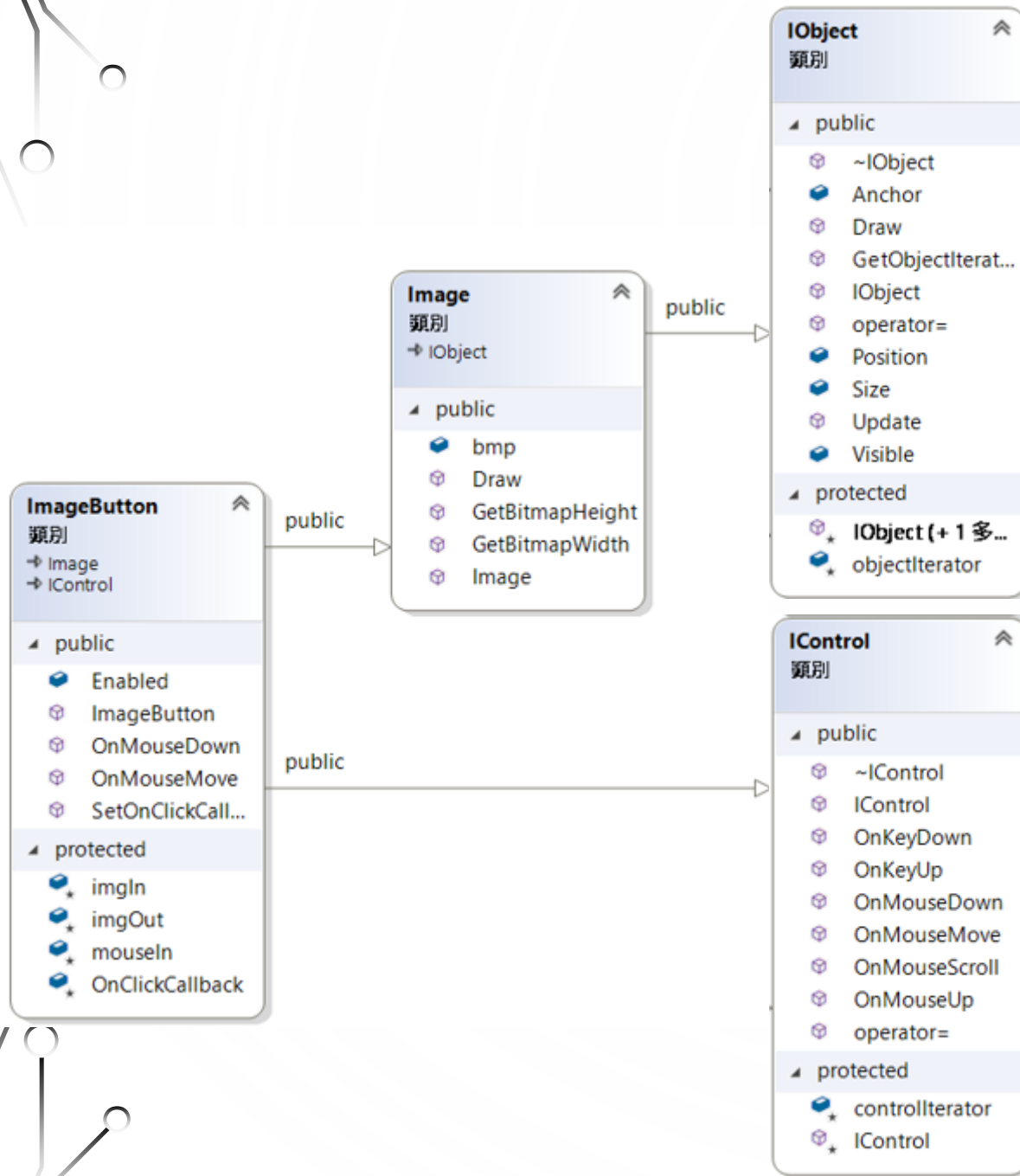
Condition –StartScene-ImageButton



GameEngine

Resources

Collider



GameEngine

Wait for
event



Process
event



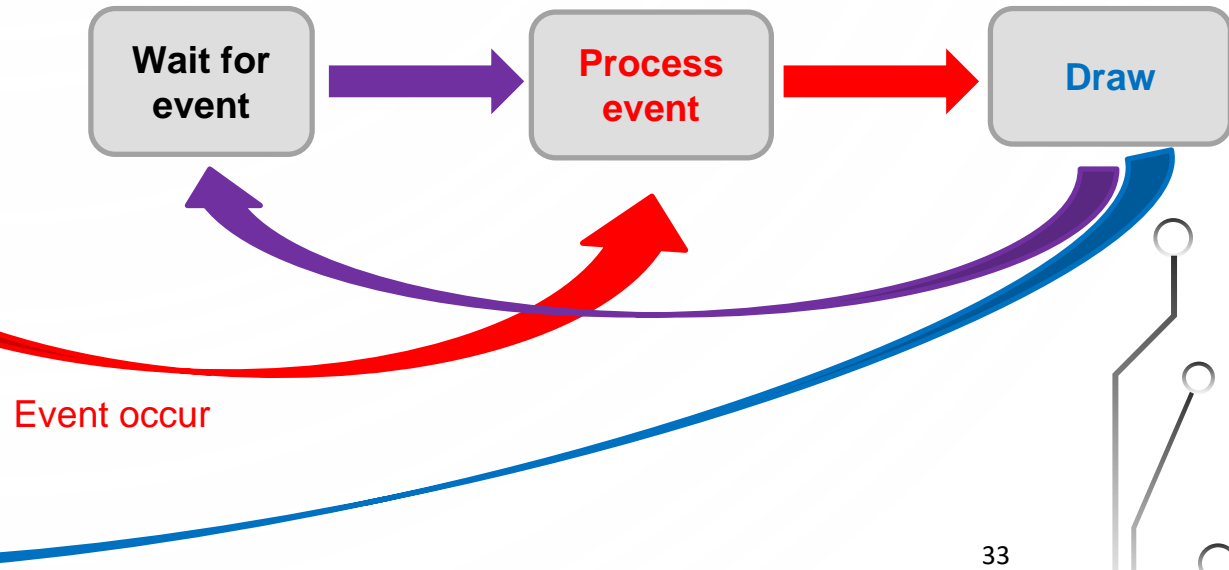
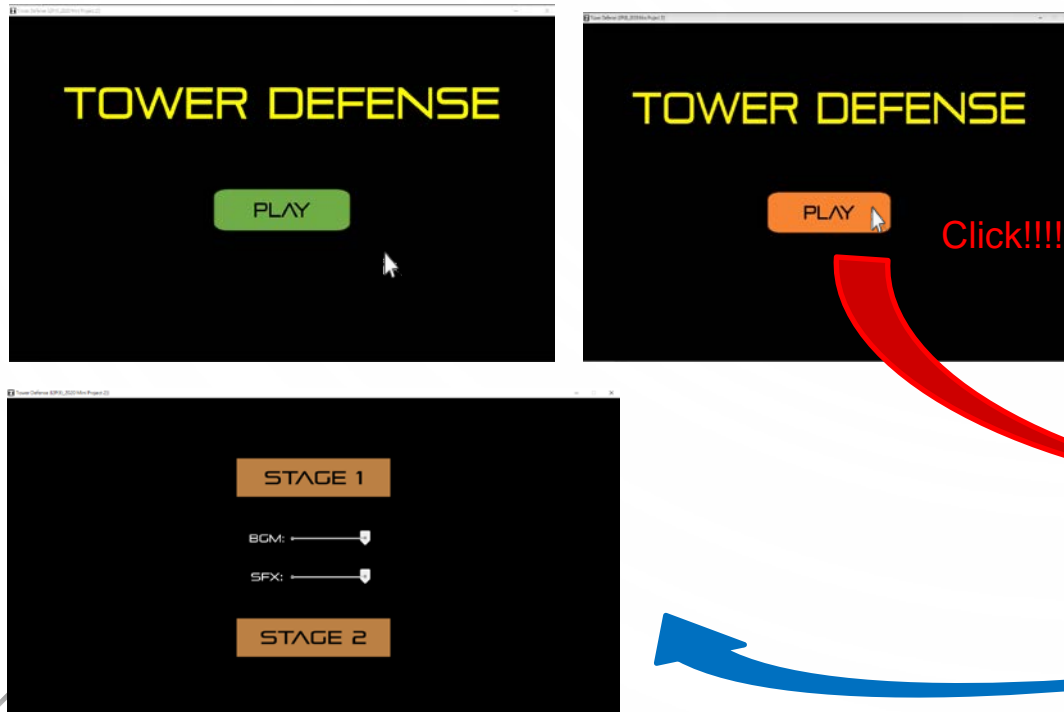
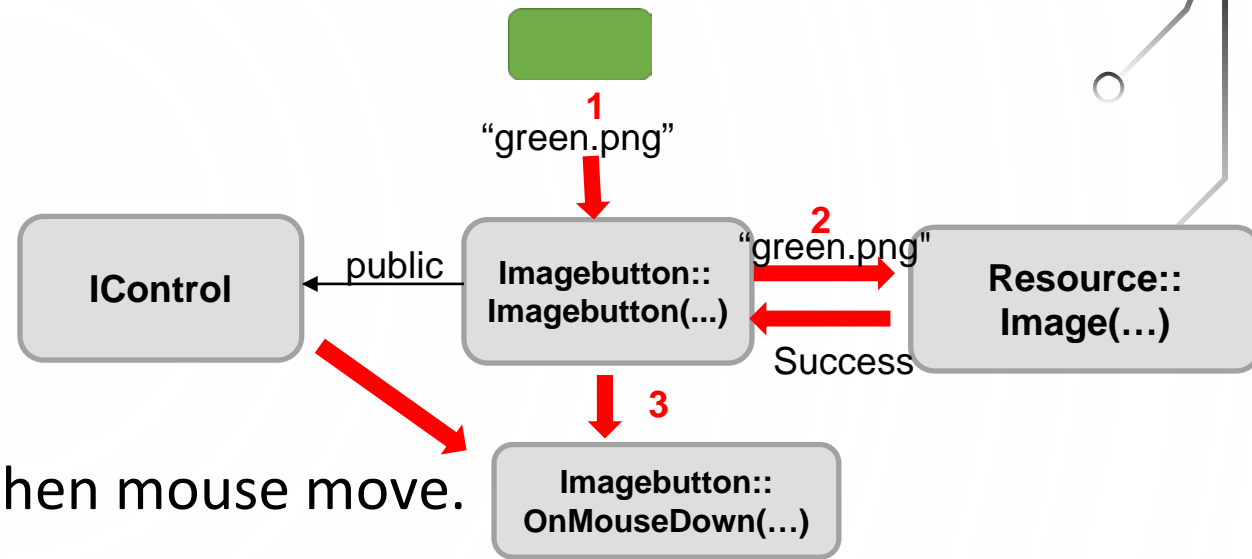
Draw



Label(Tower defense)
Label(PLAY)
Image(green.png)

ImageButton

- public Engine::IControl , Image
- A clickable button, changes image when mouse move.



GameEngine



OnMouseMove
(change img)
OnMouseDown
(change scene)



Label(Tower defense)
Label(PLAY)
Image(green.png)

Wait for
event

Process
event

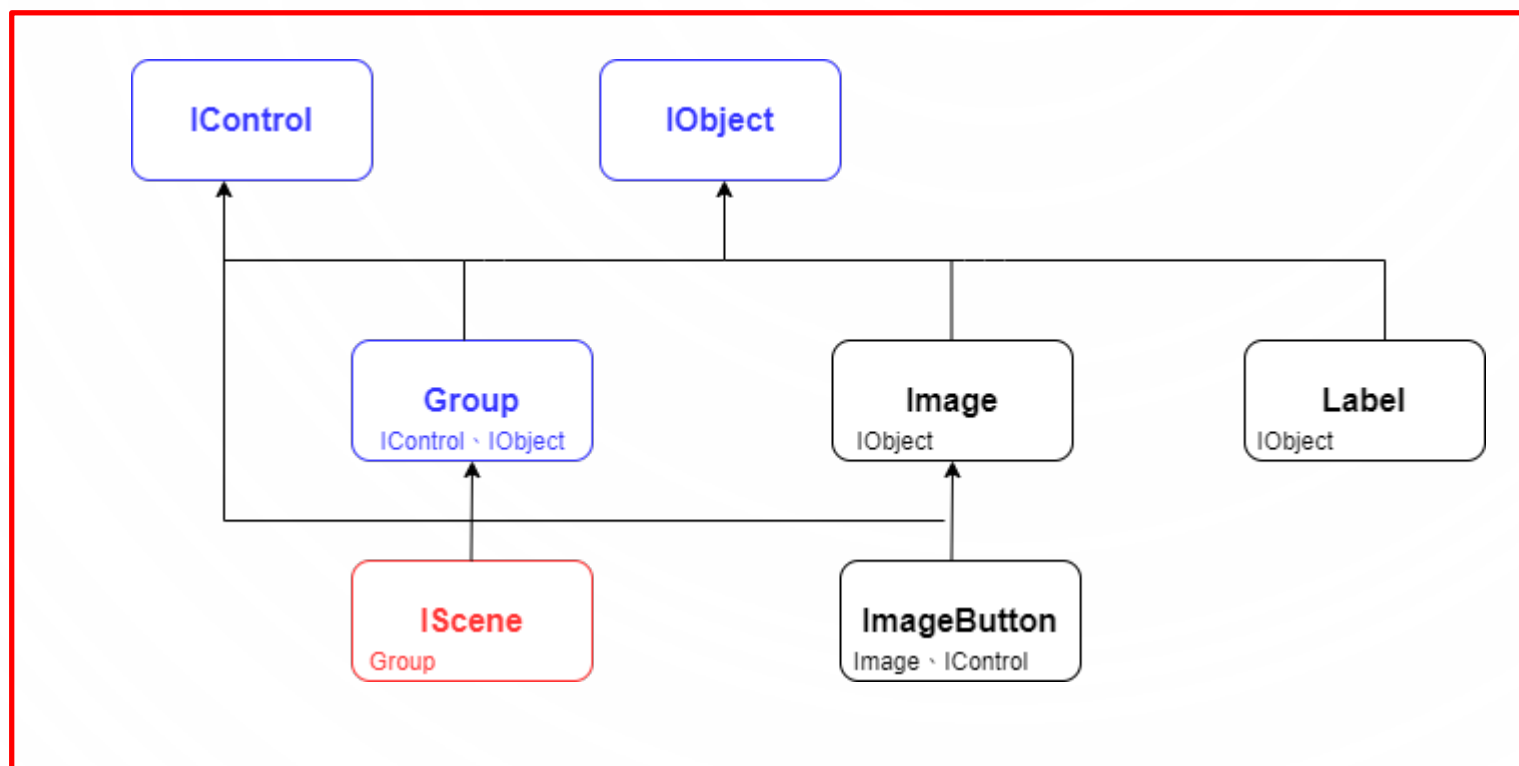
Draw



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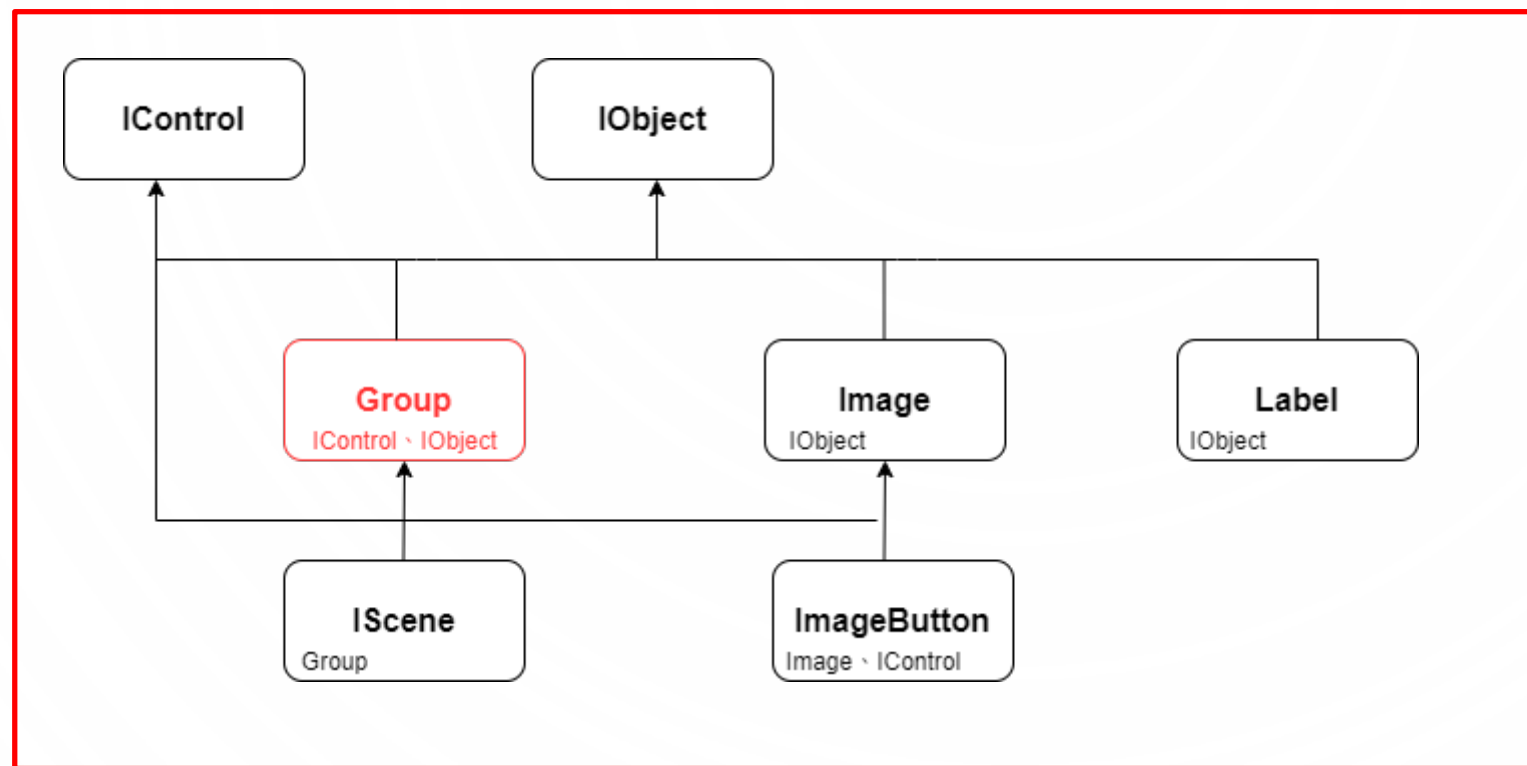
Condition –StartScene-IScene



GameEngine

Resources

Collider



GameEngine

Resources

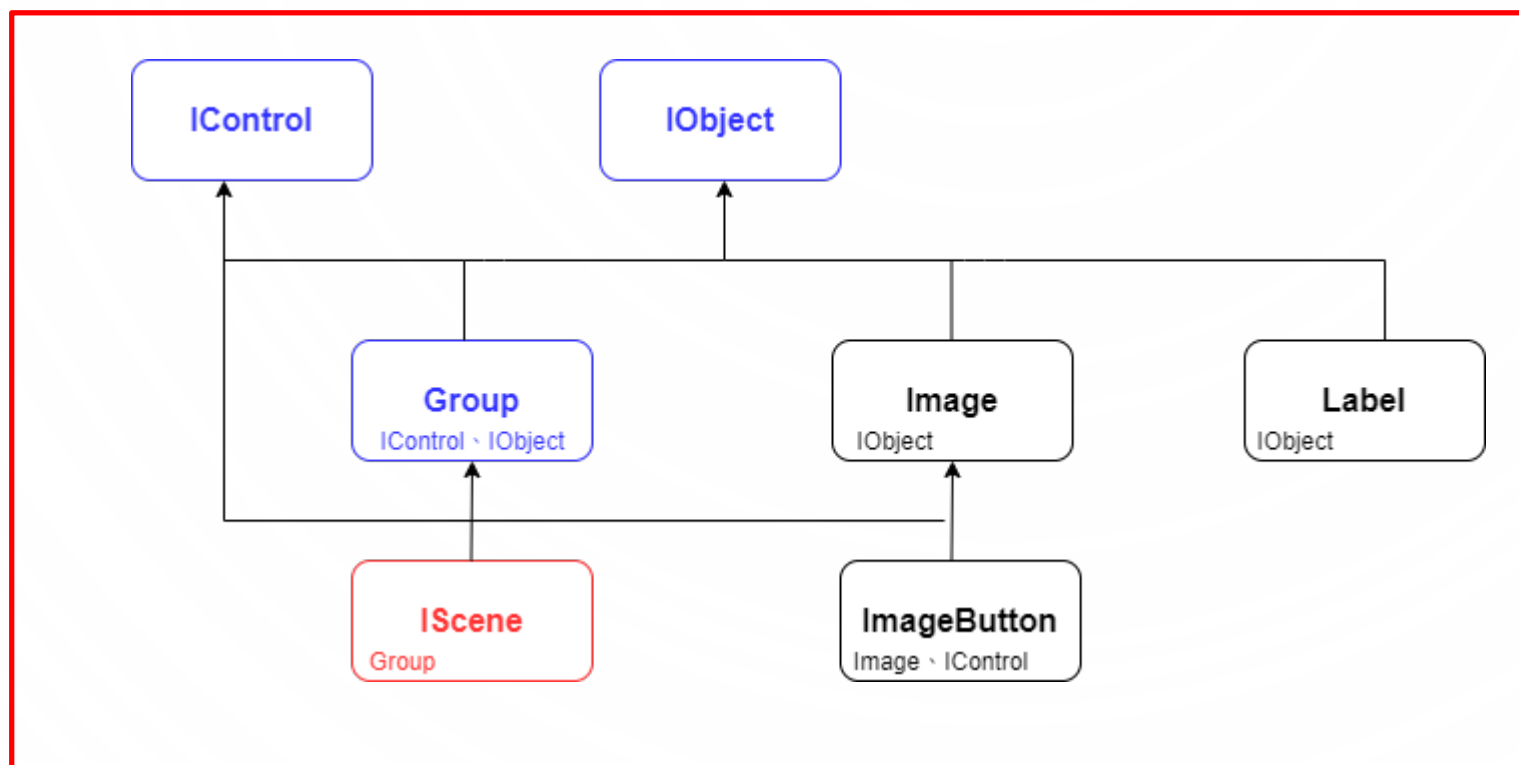
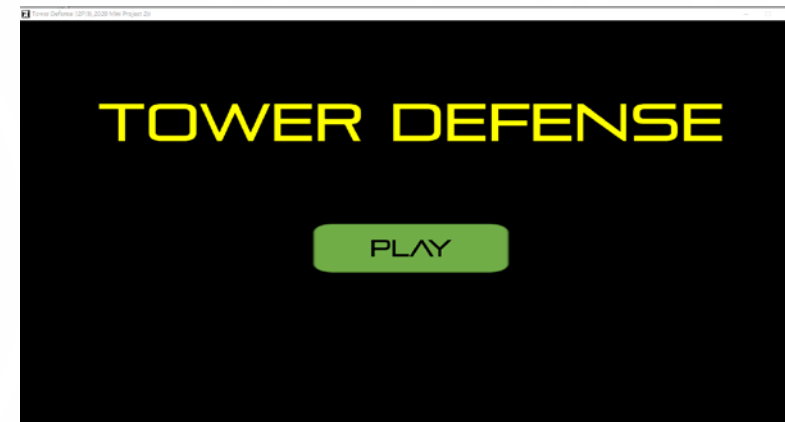
Collider



Group

- Draw and update everything for you.
- Make all objects of IObject and IControl into a individual list to manage.

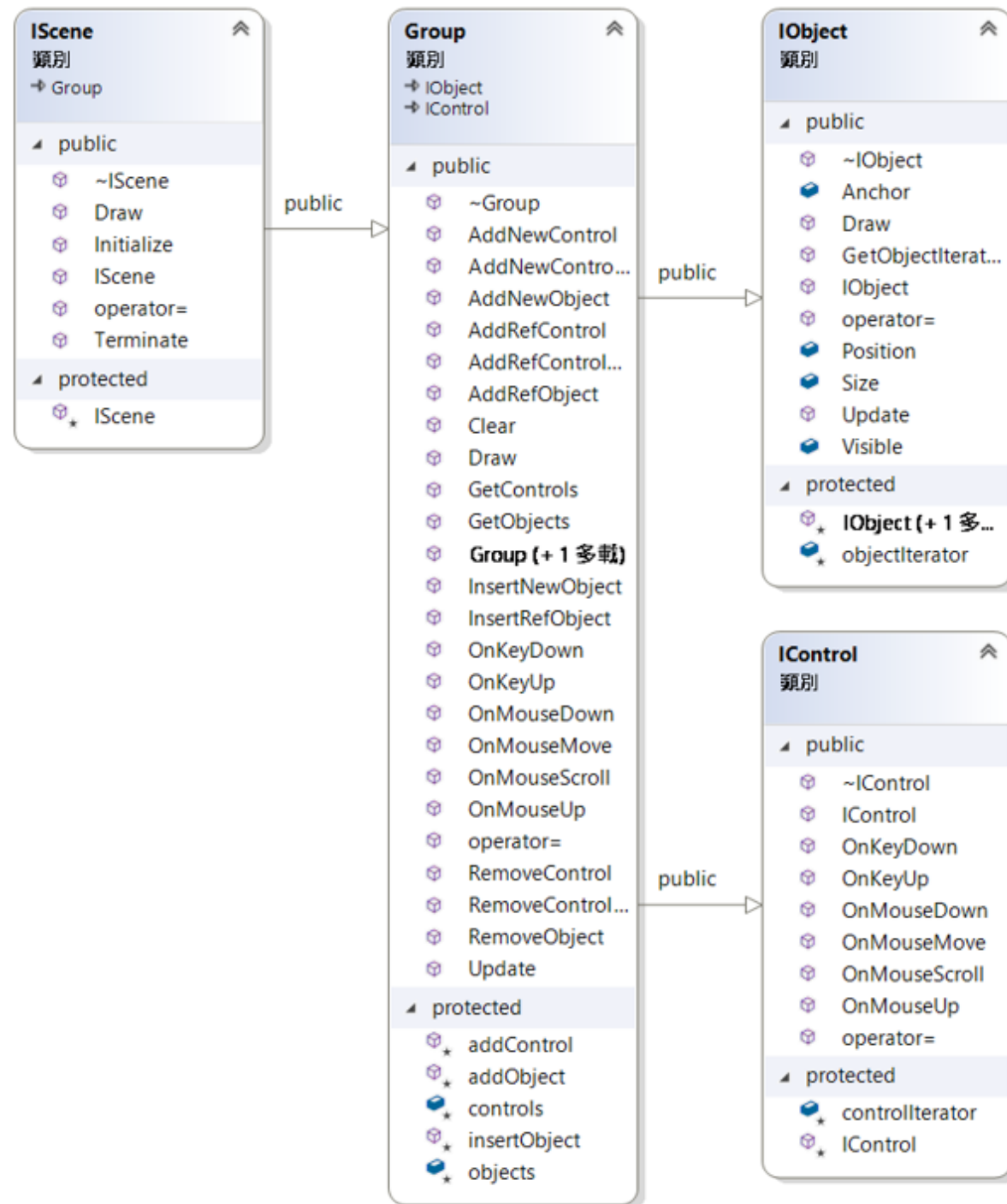
Condition –StartScene-IScene



GameEngine

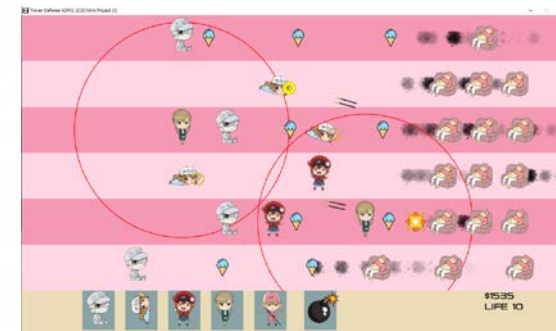
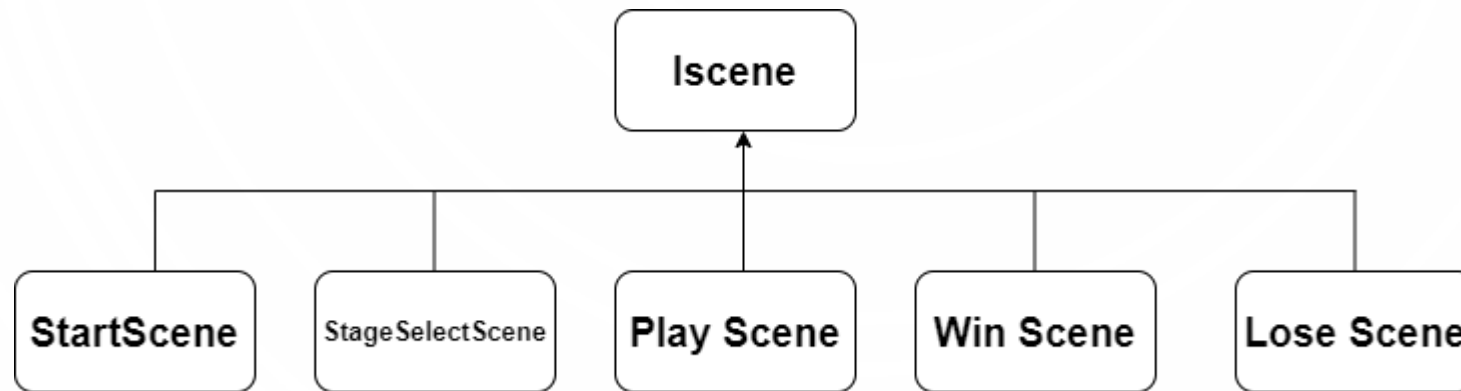
Resources

Collider



IScene

- Encapsulates a scene, must be inherited and customized.



GameEngine



OnMouseMove
(change img)
OnMouseDown
(change scene)



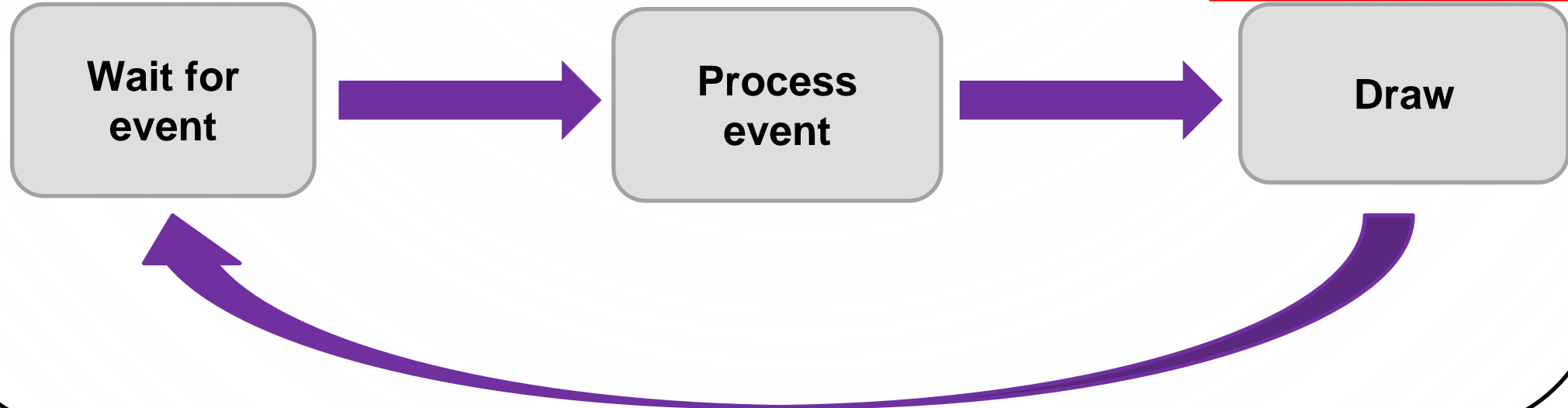
Label(Tower defense)
Label(PLAY)
Image(green.png)
Scene.draw()

Scene.process(event)

Wait for
event

Process
event

Draw

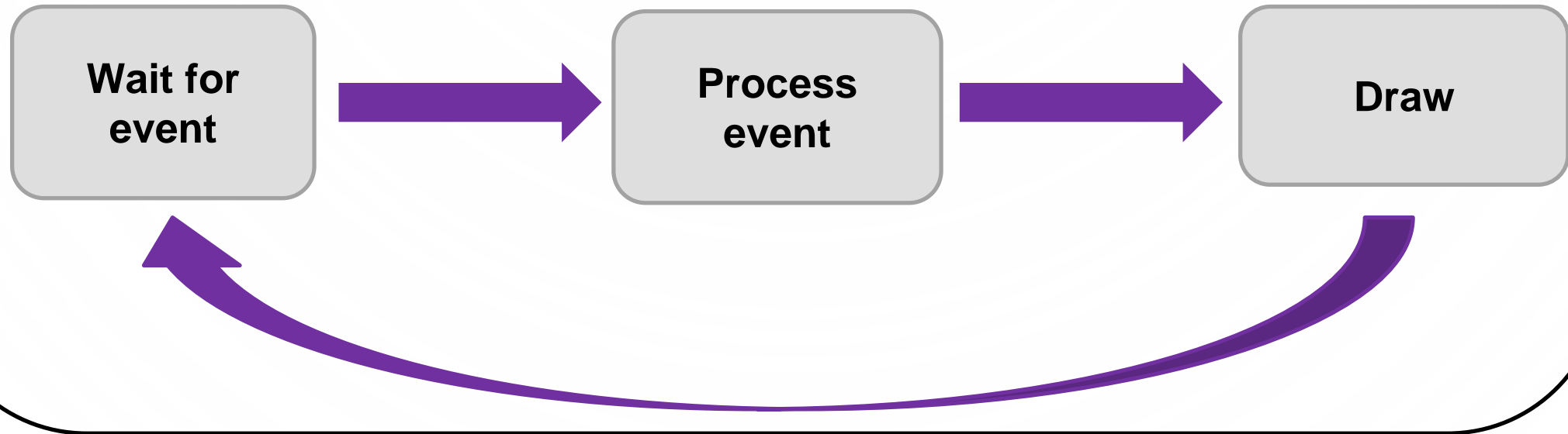


GameEngine



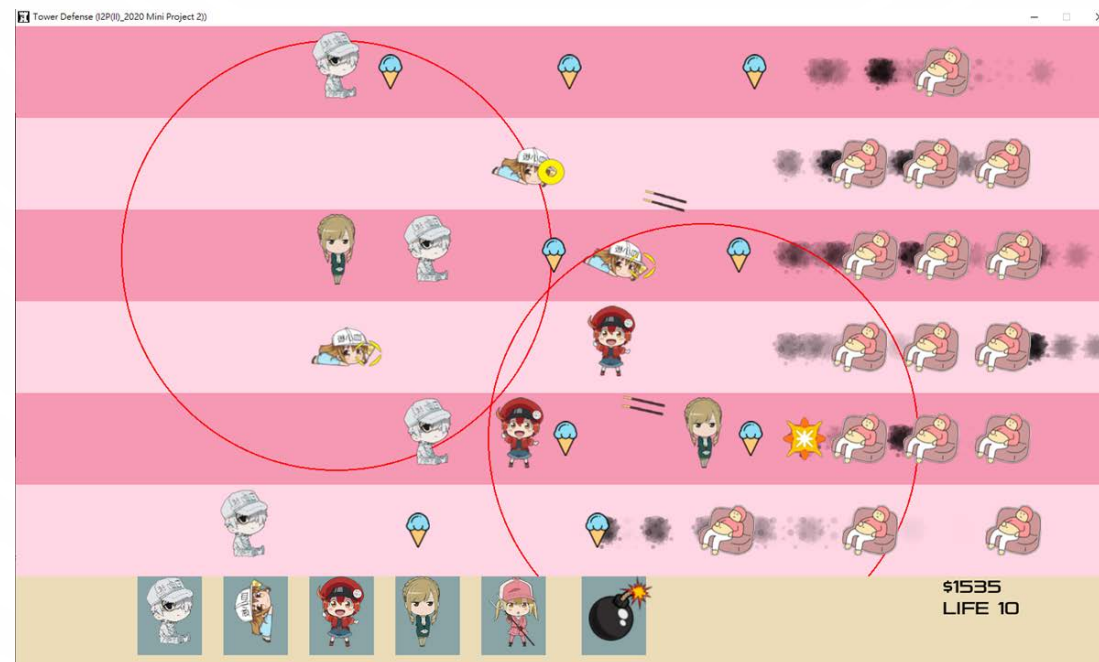
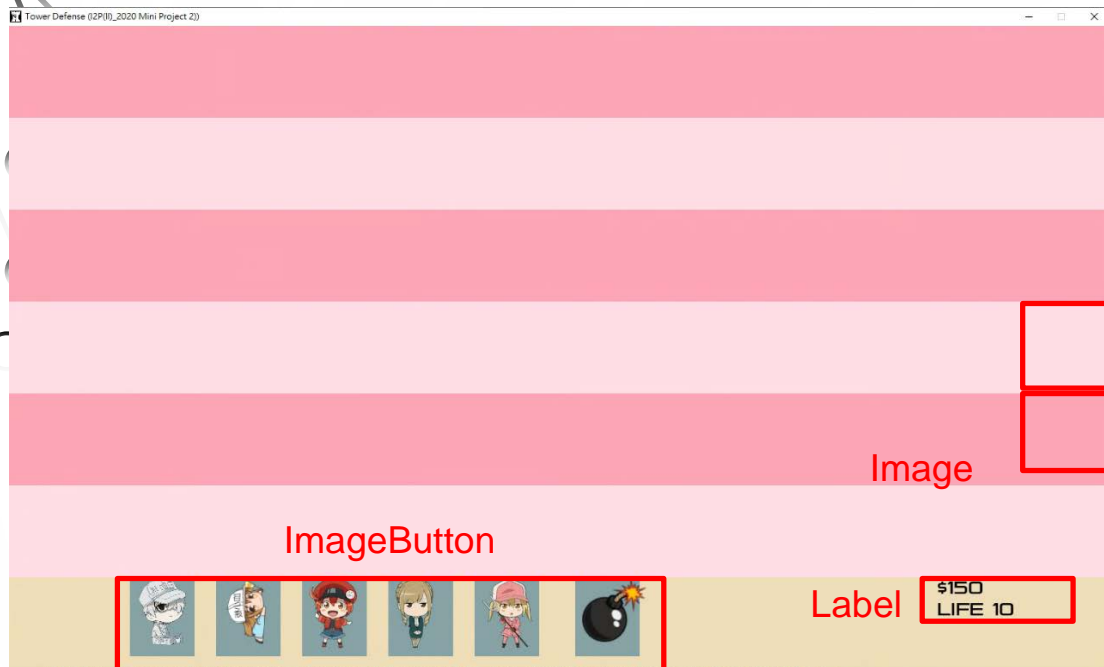
Scene.process(event)

Scene.draw()



Outline

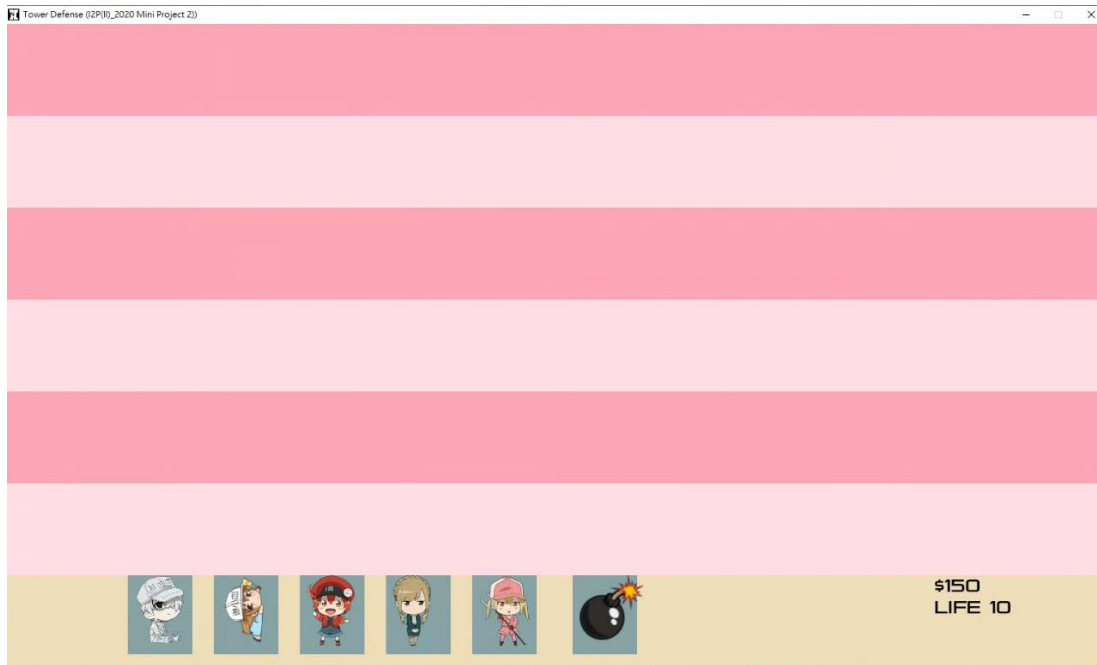
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Map file format





```
11111111111111
00000000000000
11111111111111
00000000000000
11111111111111
00000000000000
```

resources/map1.txt

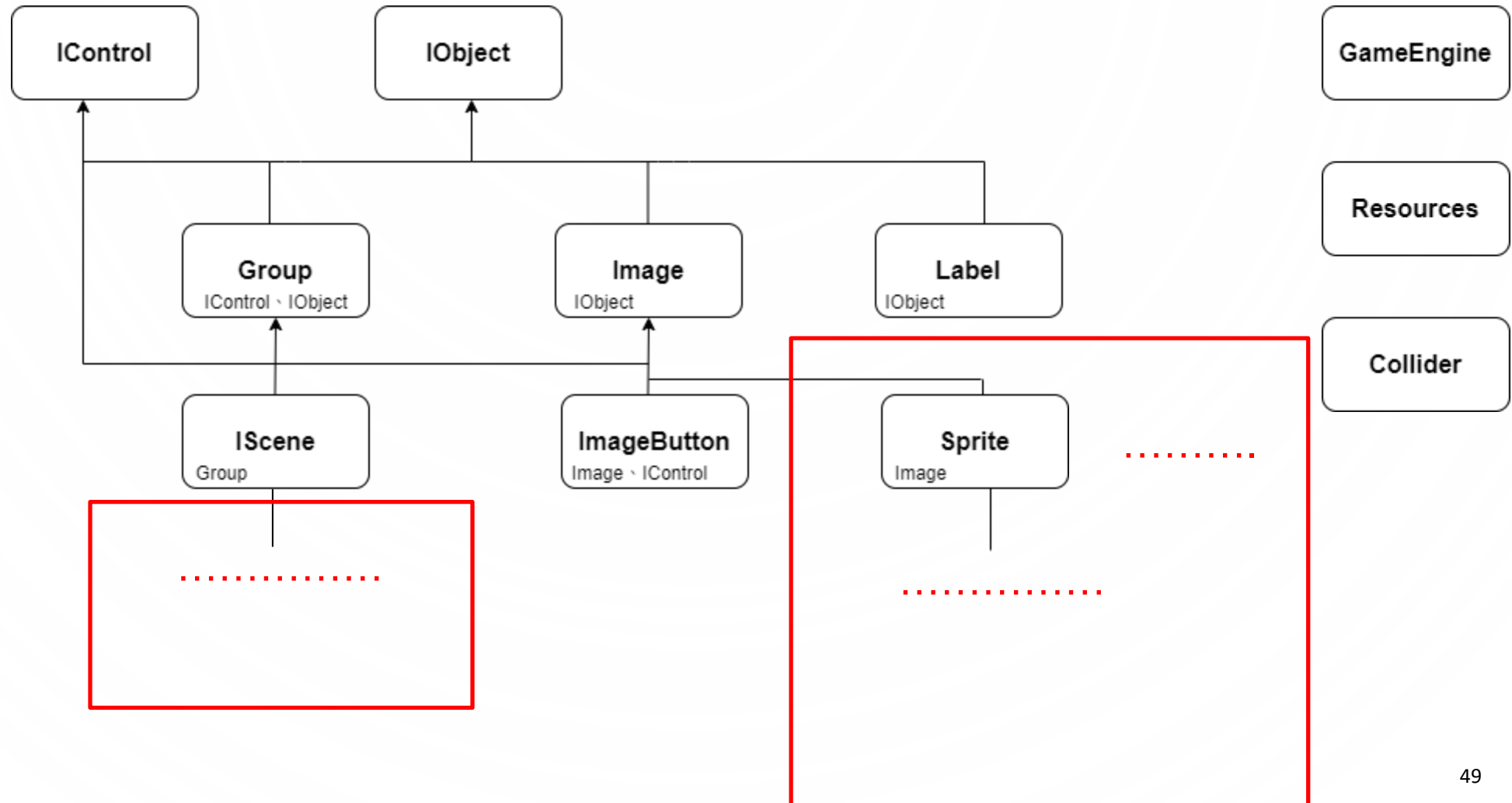
Enemy file format

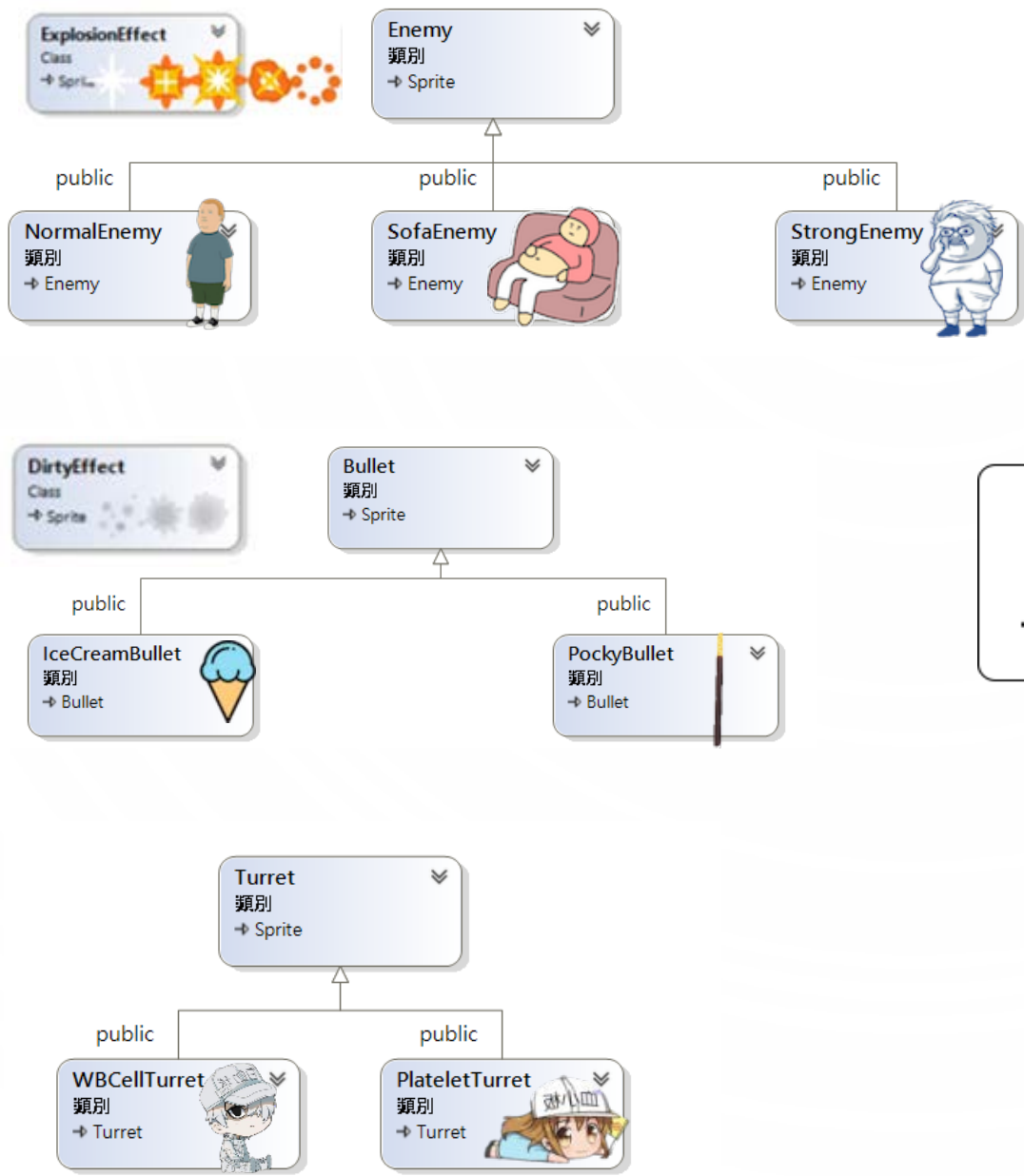
- Enemytype TimeDelay LaneNum Repeat

1	1	3	5	➡	
0	2	4	1		
1	1	2	5		
0	2	5	1		
1	0.5	1	10		
0	6	5	1		
2	1	4	1	➡	
0	2	2	1		

You should edit this file
after adding new enemy.
resources/enemy1.txt

Game Diagram





IsScene

Lose Scene

Win Scene

Play Scene

StageSelectScene

StartScene

