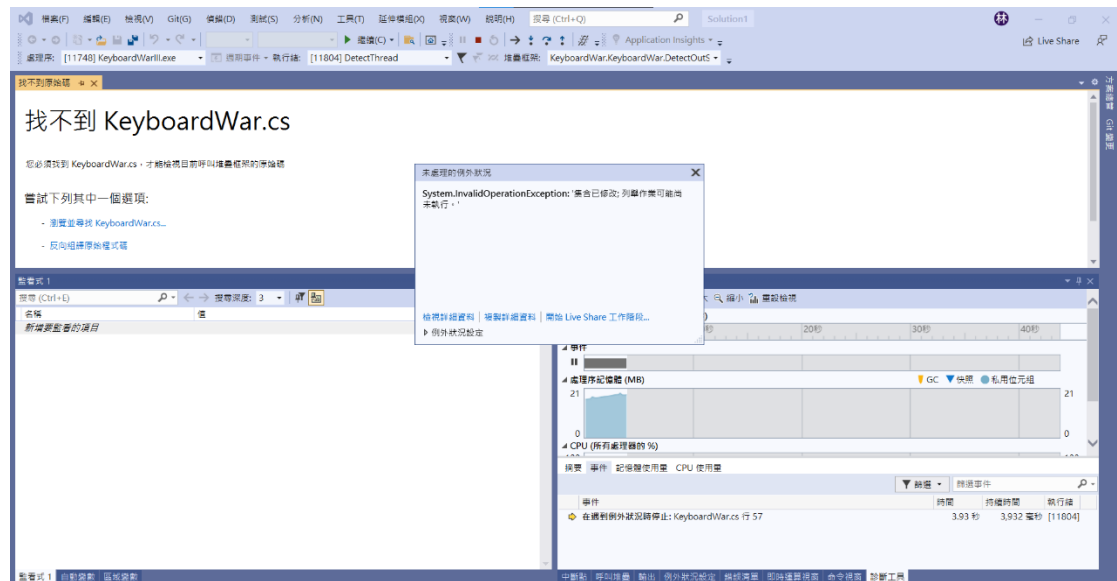


Use dump analysis to debug

1. Screenshots

(1) 例外視窗



(2) 呼叫堆疊

▼ Main Thread

呼叫堆疊	
名稱	語言
[外部程式碼]	
KeyboardWarIII.exe!KeyboardWar.Program.Main() 第 20 行	C#

▼ CreateMonsterThread

▼ DetectThread

▼ UpdateThread

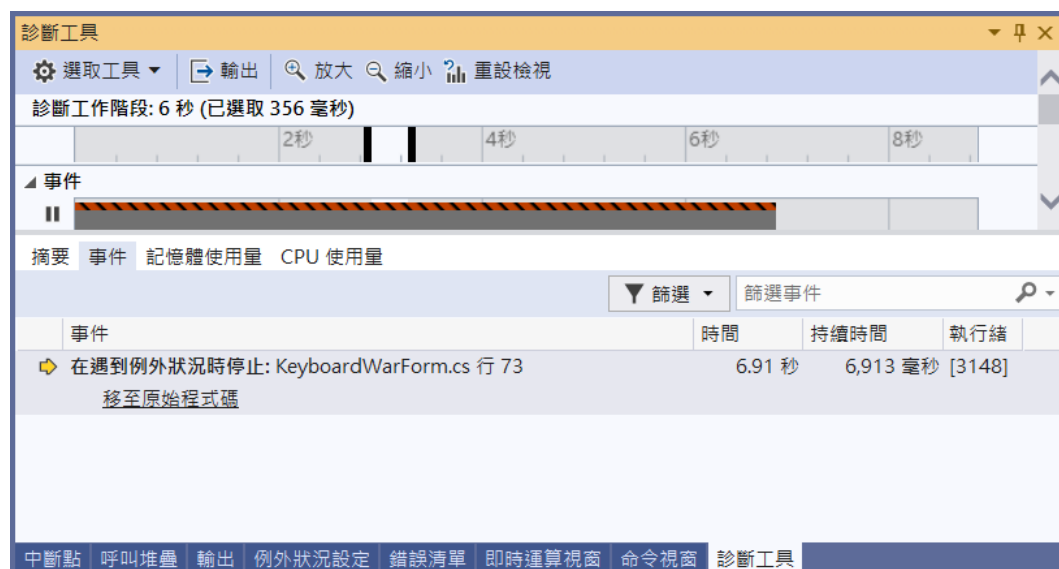
呼叫堆疊		▼	🔍	✕
名稱	語言			
[外部程式碼]				
👉 KeyboardWarIII.exe!KeyboardWar.KeyboardWarForm.Update() 第 90 行	C#			
[外部程式碼]				

2. 推論出錯的地方在哪，還有推測原因及修正方法

我覺得有可能是 DetectThread 生成 child thread 之後，會不斷去偵測有沒有掉落到最下方的(death)的字母，有的話就會 call DetectOutScreen()，然後再呼叫 UpdateThread 從 KeyboardWar.Monster list 刪除 KeyboardWar.Monster 物件。但是因為同時有兩個以上的字母掉到螢幕外，所以同時呼叫 UpdateThread 去存取 KeyboardWar.Monster list，然後就造成 crash

(1) 推測原因

先看到 crash 發生在 UpdateThred



擷取記憶體快照



看一下 KeyboardWar.Monster list 的內容，可以看到最後兩個已經是 size = empty，但是還沒有從 KeyboardWar.Monster list 中移除，因此我想是不是有可能 UpdateThread 同時要移除這兩個物件，所以才造成 crash

快照 #1 堆積 Keyboar...arlll.exe (6.91s)

快照 #2 堆積 Keyboar...arlll.exe (6.91s)

KeyboardWar.Monster 的執行個體

執行個體 ▲	值
<0x2E1950C>	Size = {IsEmpty = false}, name = "Z", isDeath = false
<0x2E19534>	Size = {IsEmpty = false}, name = "N", isDeath = false
<0x2E62BC4>	Size = {IsEmpty = false}, name = "K", isDeath = false
<0x2E62BF8>	Size = {IsEmpty = false}, name = "Z", isDeath = false
<0x2E62C20>	Size = {IsEmpty = false}, name = "P", isDeath = false
<0x2E62C48>	Size = {IsEmpty = false}, name = "P", isDeath = false
<0x2E62C70>	Size = {IsEmpty = false}, name = "L", isDeath = false
<0x2E62C98>	Size = {IsEmpty = false}, name = "Y", isDeath = false
<0x2E62CC0>	Size = {IsEmpty = false}, name = "A", isDeath = false
<0x2E62CE8>	Size = {IsEmpty = false}, name = "J", isDeath = false
<0x2E62D10>	Size = {IsEmpty = false}, name = "R", isDeath = false
<0x2E62D38>	Size = {IsEmpty = false}, name = "T", isDeath = false
<0x2E62D60>	Size = {IsEmpty = false}, name = "J", isDeath = false
<0x2E62D88>	Size = {IsEmpty = false}, name = "C", isDeath = false
<0x2E62DB0>	Size = {IsEmpty = false}, name = "L", isDeath = false
<0x2E9827C>	Size = {IsEmpty = false}, name = "T", isDeath = false
<0x2E982A4>	Size = {IsEmpty = false}, name = "F", isDeath = false
<0x2E982CC>	Size = {IsEmpty = false}, name = "J", isDeath = false
<0x2E982F4>	Size = {IsEmpty = false}, name = "R", isDeath = false
<0x2E9831C>	Size = {IsEmpty = false}, name = "Y", isDeath = false
<0x2E98344>	Size = {IsEmpty = false}, name = "V", isDeath = false
<0x2E9836C>	Size = {IsEmpty = false}, name = "D", isDeath = false
<0x2E98394>	Size = {IsEmpty = true}, name = "B", isDeath = false
<0x2E984D4>	Size = {IsEmpty = true}, name = "V", isDeath = false

(2) 修正方法

可能要再 Update() 加上 lock，讓 Update() 只能讓一個 DetectThread 呼叫，就能一次刪除一個 KeyboardWar.Monster 物件，避免發生 race 的情況