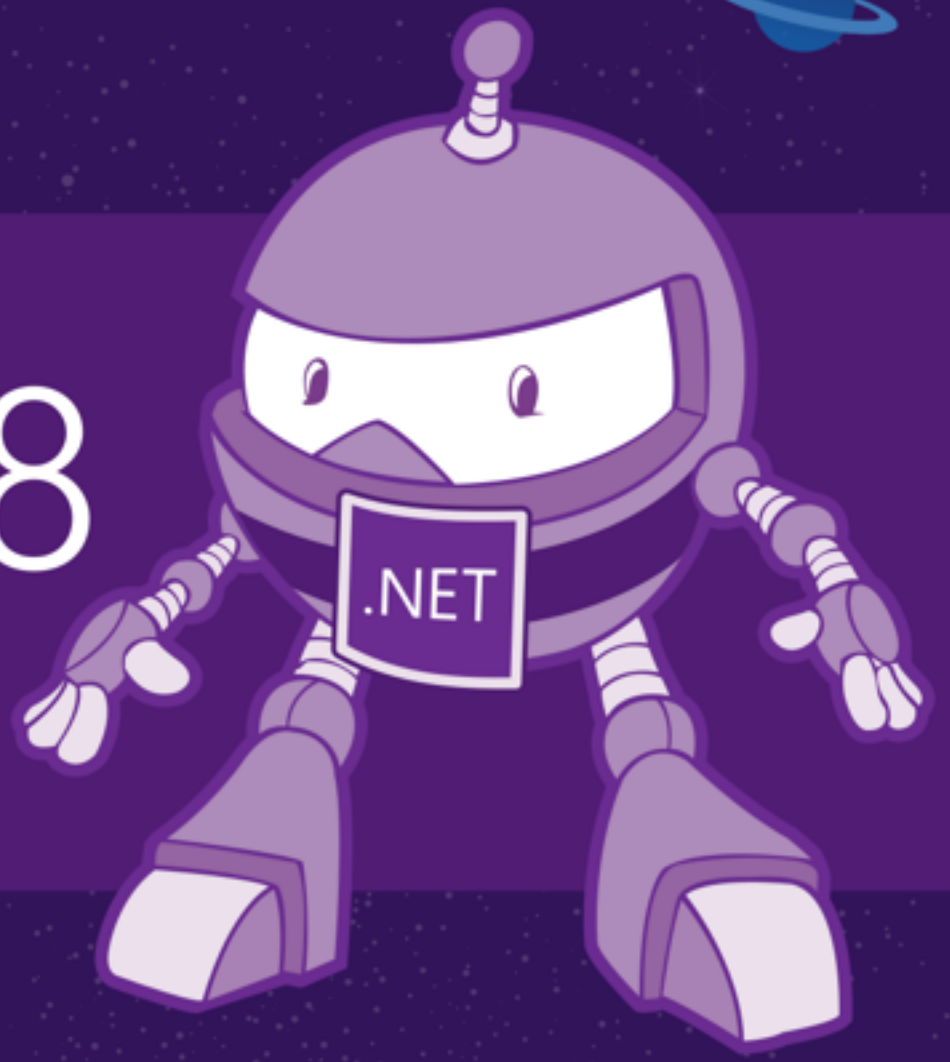
.NET Conf 2018

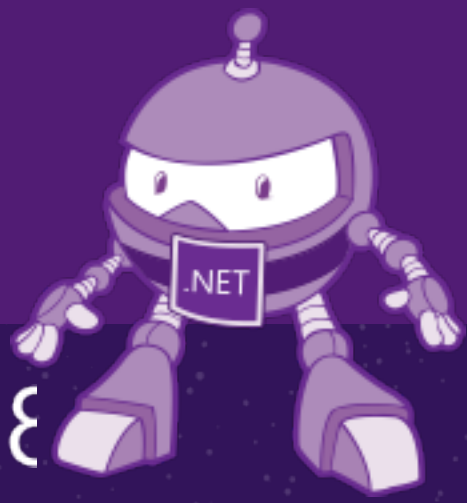
Discover the world of .NET



www.dotnetconf.net

GARBAGE COLLECTION IN .NET

BRUNO JAN



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STUDY4.TW
為學習而生

關於我


STUDY4.TW
為學習而生


Scrum Alliance
CSD
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CSM
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AGENDA

- .NET 記憶體堆積
- GARBAGE COLLENTION的身世之謎
- GC何時運作？
- GARBAGE COLLENTION 的執行模式
- PROGRAMING 與 GC

先來個小小調查

GC的功用？

記憶體使用率居高不下
導致程序效能不佳

伺服器上的記憶體
在某一時間點不夠用...

出現了
OUT OF MEMORY EXCEPTION

怎麼解決這類的問題？

先來了解GC的功用

回收不在需要的記憶體空間

減少存在於
記憶體空間的碎片

如果要了解GC
不得不先了解PROCESS！

PROCESS

HEAP

STACK

DATA

TEXT

PROCESS

HEAP

STACK

DATA

TEXT

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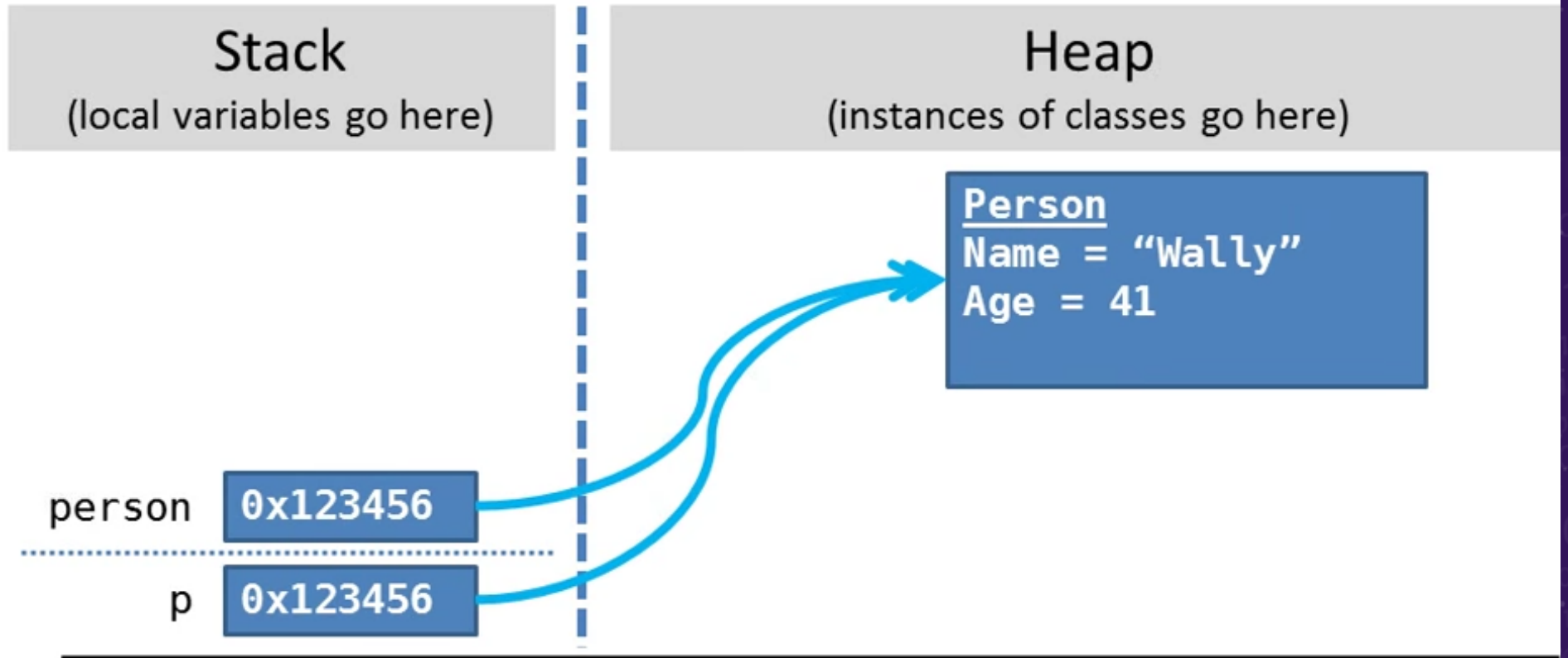
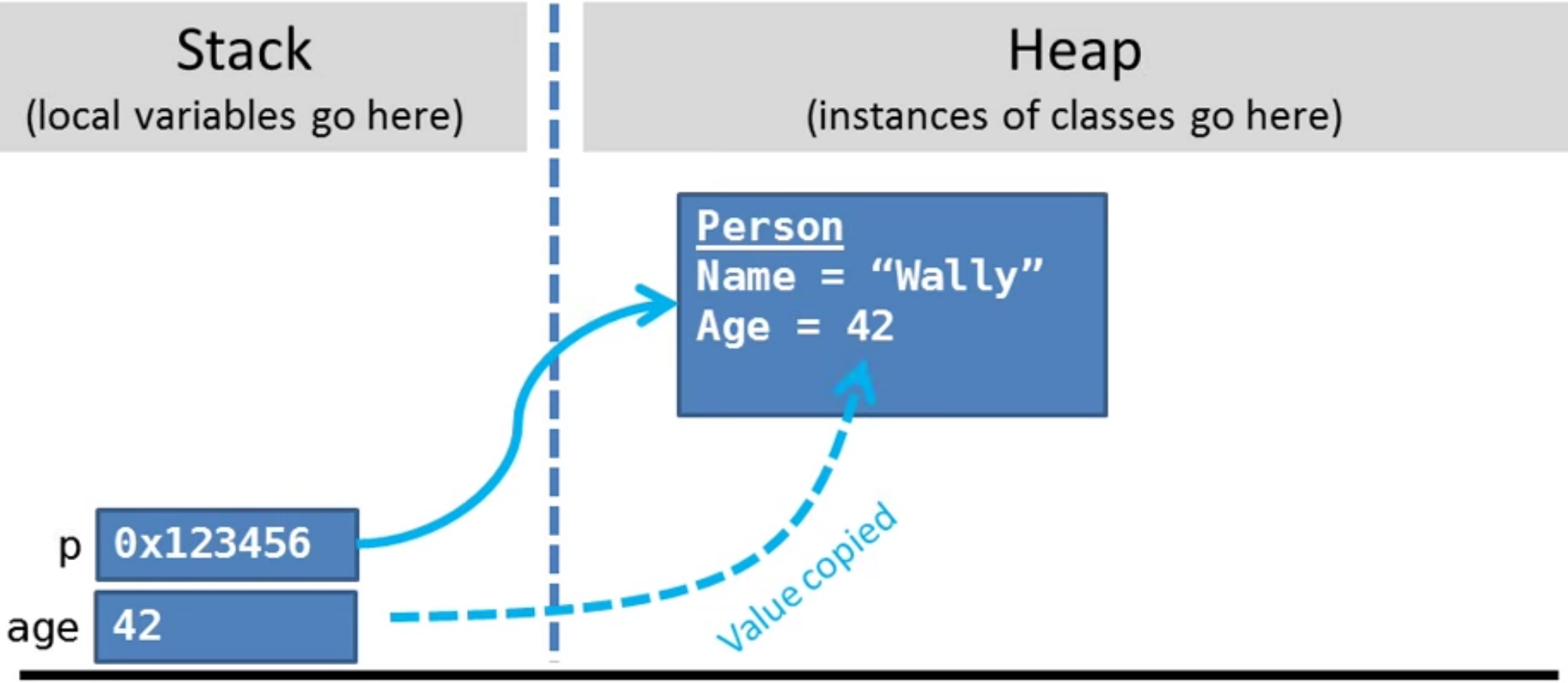
簡單點？




```
static void Main()
{
    Person p = new Person(“Wally”, 40);
    CelebrateBirthday(p);
}

static void CelebrateBirthday(Person person)
{
    person.Age = person.Age + 1;
}
```




```
static void Main()
{
    int age = 42;
    Person p = new Person();
    p.Name = “Wally”;
    p.Age = age;
}
```

恩？
我們的主題GC在哪？

MANAGEMENT

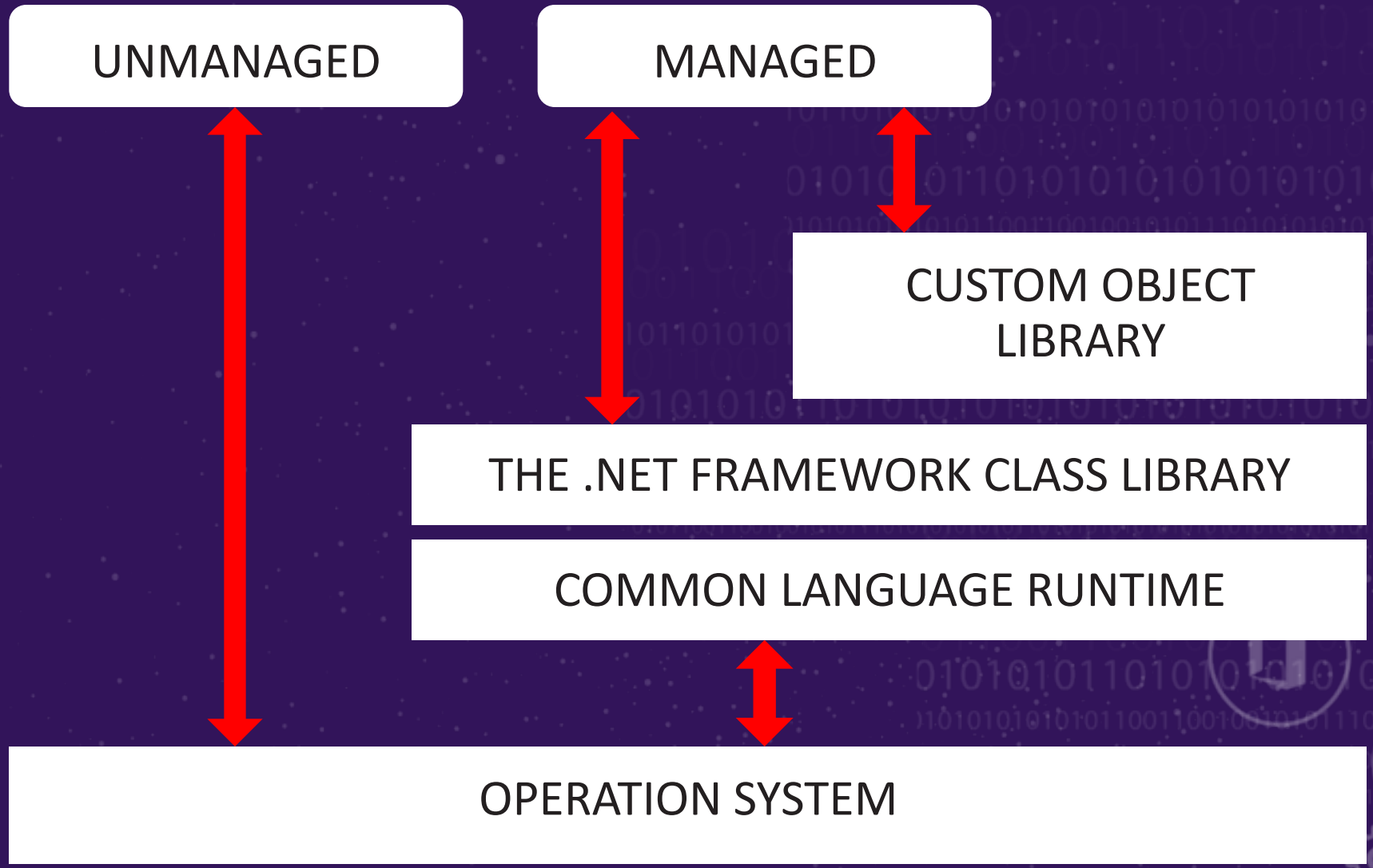
C#, F#, VB.NET,
.NET STANDARD

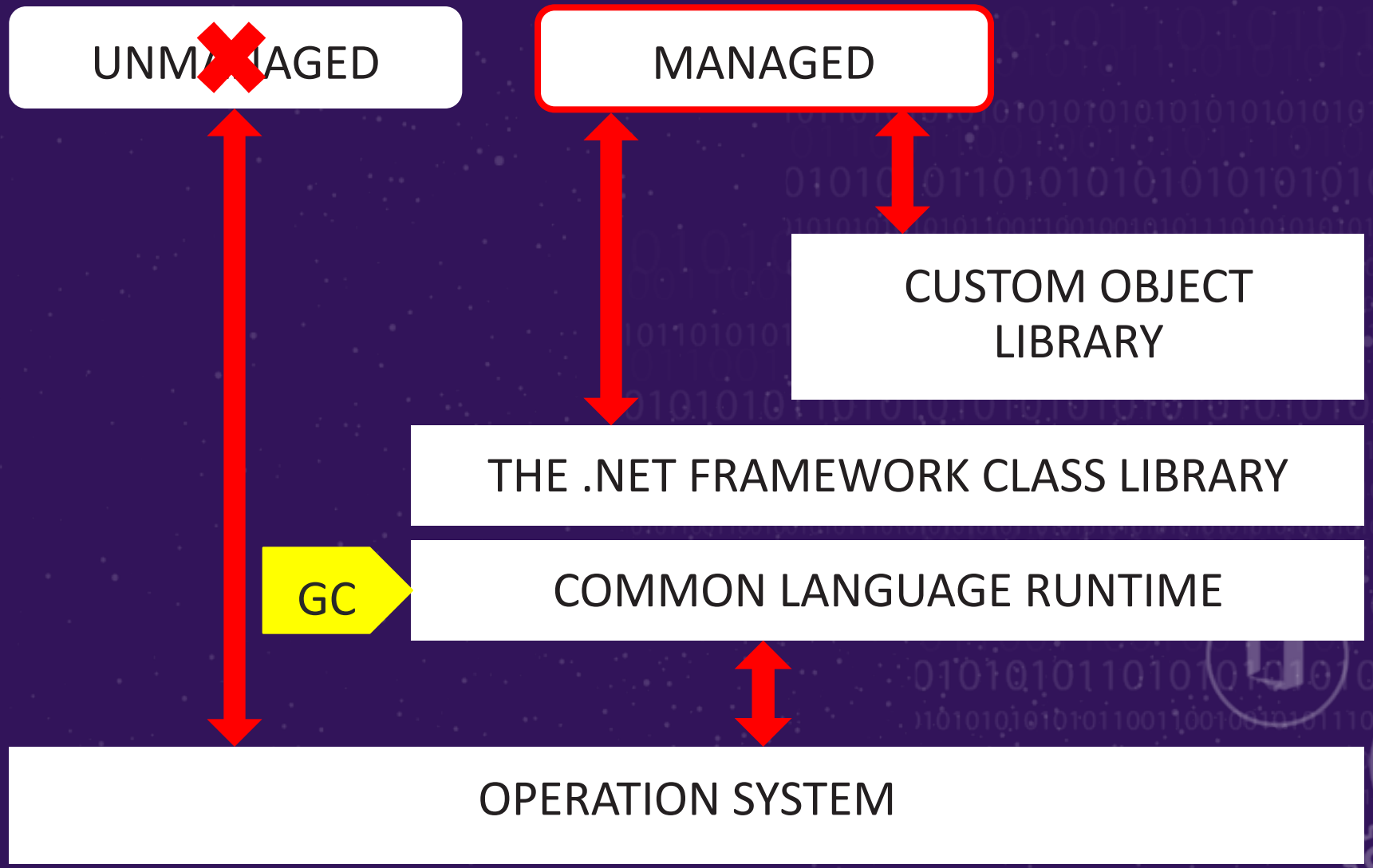
任何會經過.NET CLR
執行的都屬於
MANAGEMENT

UNMANAGEMENT

C, C++, JAVA, PYTHON
…

這些不會經過.NET CLR的
都不屬於MANAGEMENT
所以我們稱他們為
UNMANAGEMENT


UNMANAGED
MANAGED
CUSTOM OBJECT LIBRARY
THE .NET FRAMEWORK CLASS LIBRARY
COMMON LANGUAGE RUNTIME
OPERATION SYSTEM

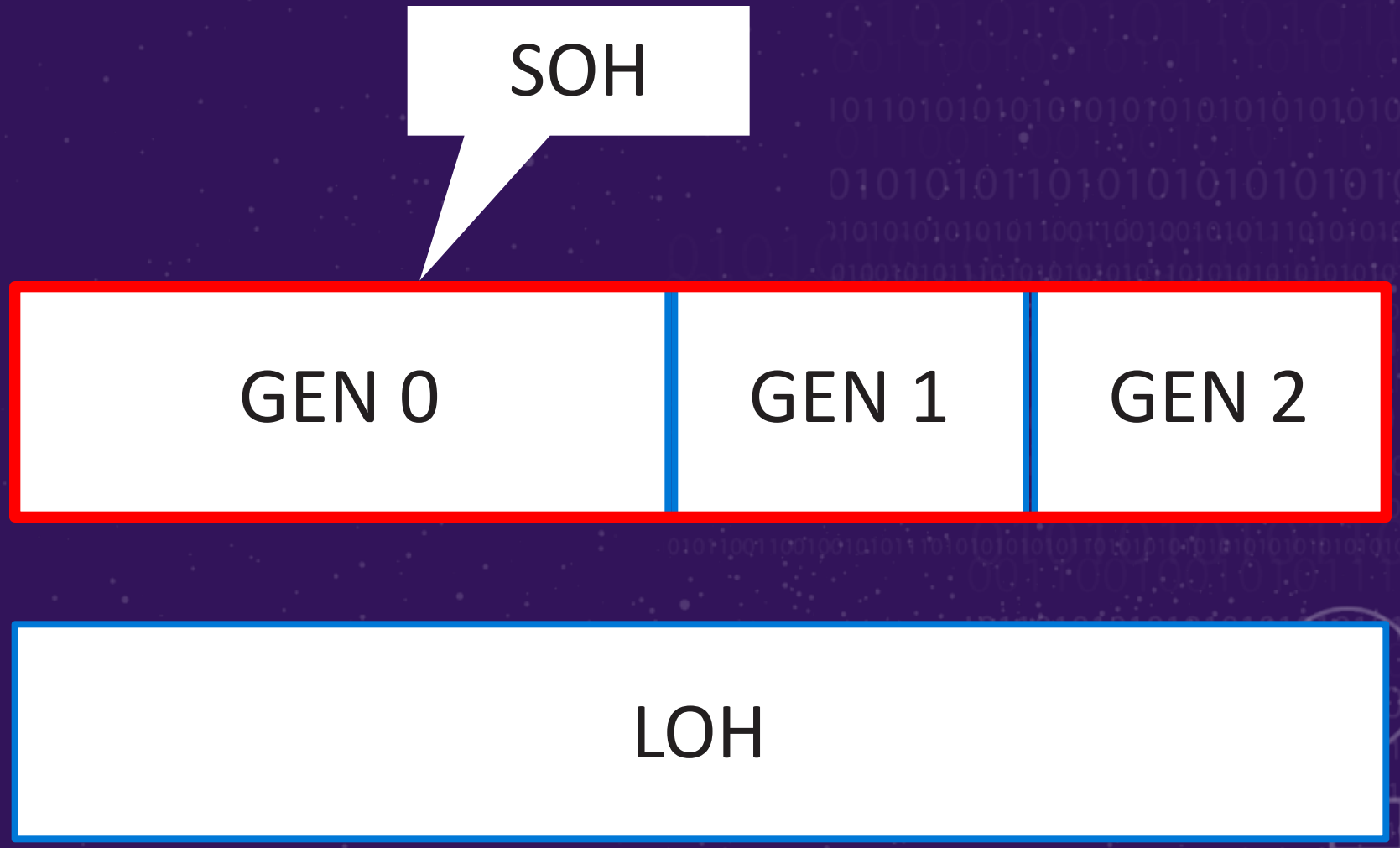

UNMANAGED
MANAGED
CUSTOM OBJECT LIBRARY
THE .NET FRAMEWORK CLASS LIBRARY
GC
COMMON LANGUAGE RUNTIME
OPERATION SYSTEM

GC其實沒這麼困難

只是有了GC，
物件也不一定會回收

SOH

LOH


SOH
GEN 0
GEN 1
GEN 2
LOH

GC什麼時候運作？

GC除了區塊還分模式

WORKSTATION

SERVER

.NET

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CONSOLE APPLICATION

WEB APPLICATION

.NET

```
<ServerGarbageCollection>
    false
</ServerGarbageCollection>
```

```
<ConcurrentGarbageCollection>
    true
</ConcurrentGarbageCollection>
```

CODE怎麼寫
GC比較不會出問題？

物件不要預先建立，
真正需要用到時才建立

物件不要預先建立，真正需要用到時才建立

```
IObject o;

....

o = new object();
```

宣告適合大小的物件

使用STRUCT
不一定使用CLASS

宣告物件存活區塊

宣告物件存活區塊

```
using (var ms = new MemoryStream())
{

}
```

注意使用 UNMANAGEMENT的物件

除非真正需要
不然避免自己實作FINALIZ

獨體模式或共用物件
減少物件宣告

預先宣告LIST, DICTIONARY的大小

有想過LIST這類的物件
呼叫ADD會做什麼嗎？

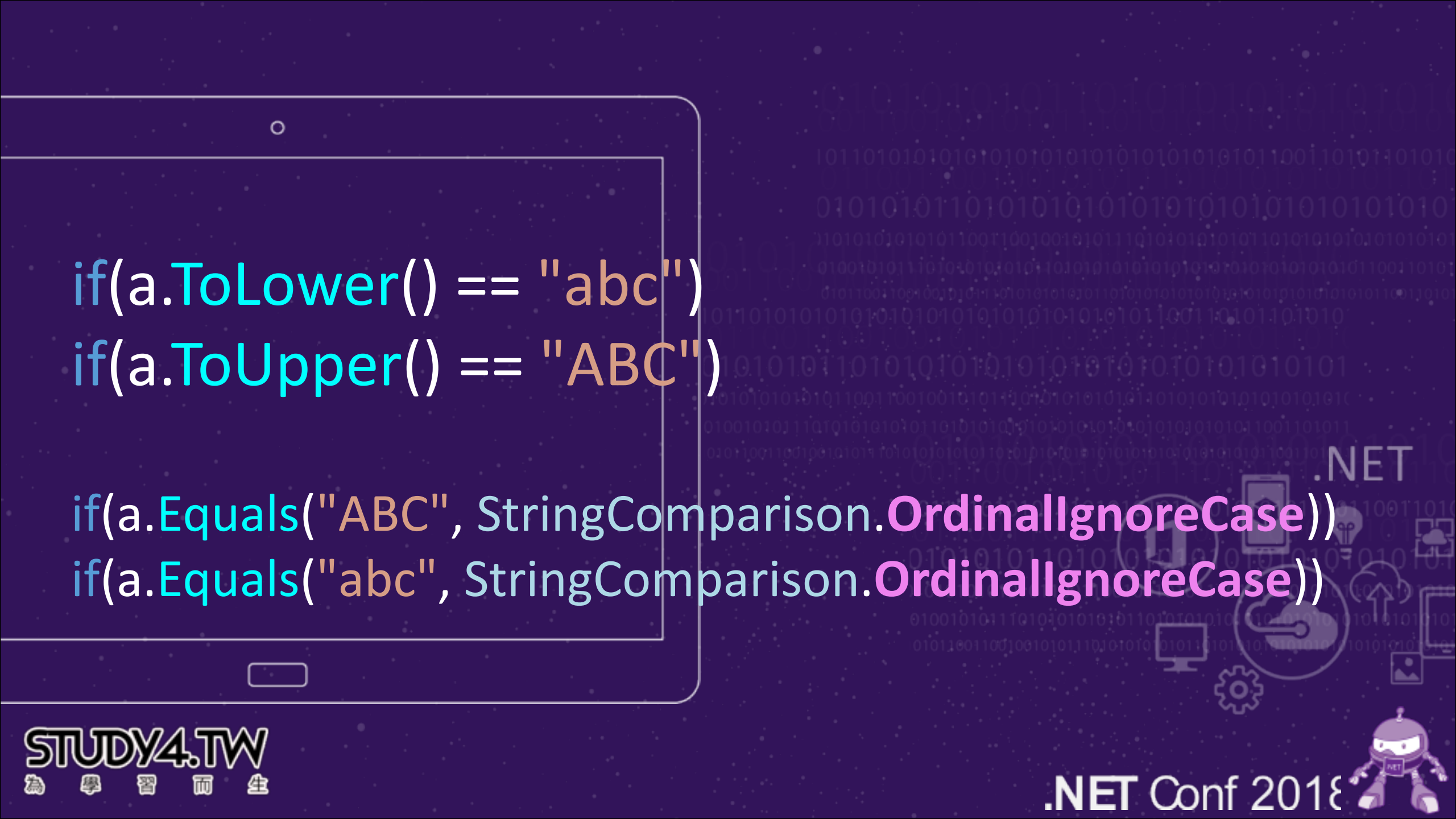
STRING,
我們最常使用物件...

```
var b = "abc";
var a = "123";
a = a + b;
```

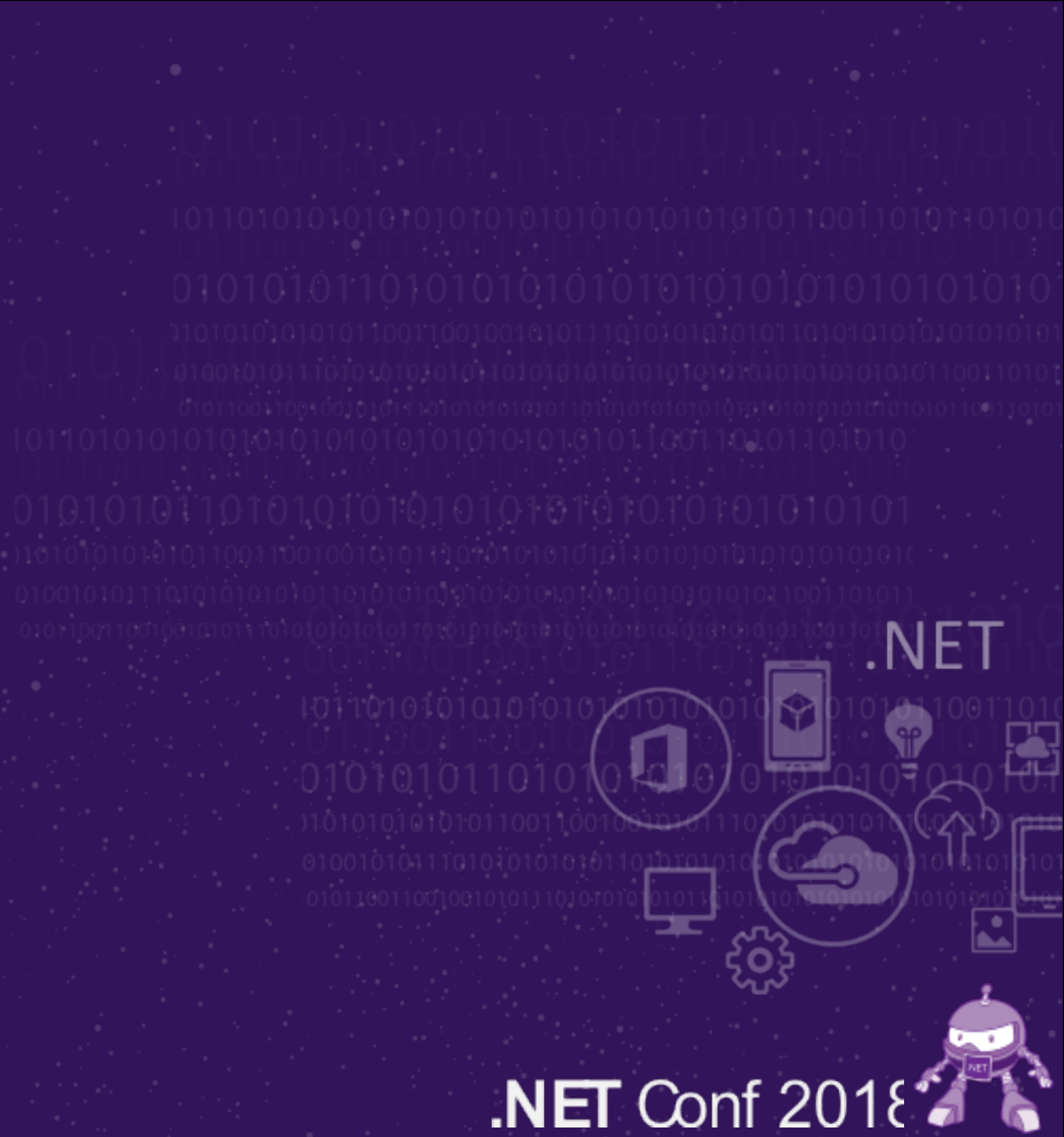
```
var sb = new StringBuilder();
sb.Append("123");
sb.Append("abc");
```

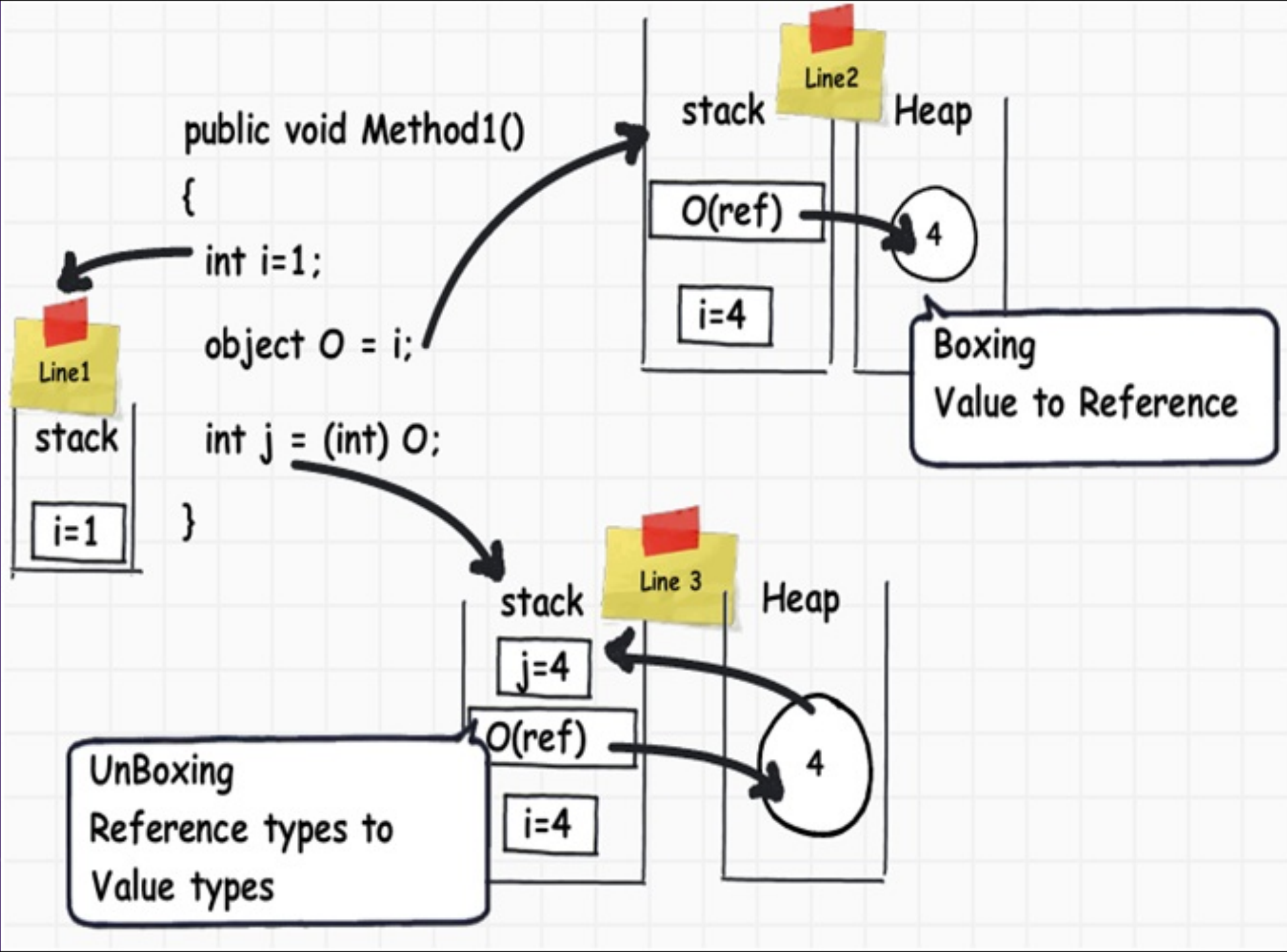
```
if(a.ToLower() == "abc")
if(a.ToUpper() == "ABC")

if(a.Equals("ABC", StringComparison.OrdinalIgnoreCase))
if(a.Equals("abc", StringComparison.OrdinalIgnoreCase))
```



BOXING
UNBOXING




public void Method1()
{
int i=1;
object O = i;
int j = (int) O;
}
Line1
stack
i=1
Line2
stack
Heap
O(ref)
4
i=4
Boxing
Value to Reference
Line 3
stack
Heap
j=4
O(ref)
4
i=4
UnBoxing
Reference types to
Value types

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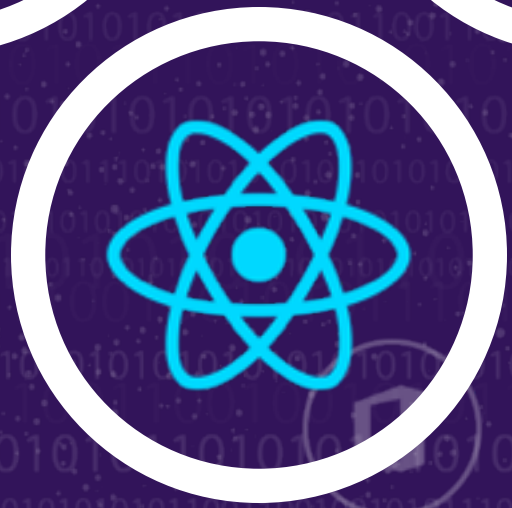

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