Disadvantages of System.Random in C#

In this lesson, we introduce the System.Random in C# and highlight some of the problems with it.

WE'LL COVER THE FOLLOWING ^

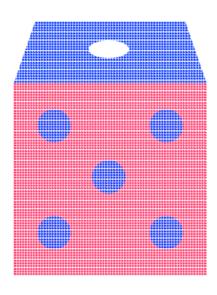
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Introducing System.Random

The C# design team tries hard to make the language a *pit of success*, where the natural way to write programs is also the correct, elegant and performant way. And then System.Random comes along; it is almost always wrong, and it is seldom easy to make it right.

Let's start with the obvious problem: the natural way to use it is also the wrong way.

The naive developer thinks "I need a new random dice roll"



```
void M()
{
   Random r = new Random();
   int x = r.Next(1, 6);
   ...
```

Let's highlight some of the issues with this code.

Problem with System.Random

Firstly, every time M() is called, we create a new Random, but in most of the implementations of Random available for the last couple decades, by default, it seeds itself with the current time, and the granularity of the timer is only a few milliseconds. Computers run on the nanosecond scale, and so the likelihood that we'll get two Random's with the same seed is very high, and therefore it is very likely that successive calls to M() produce runs of the same number. You never want to make a new Random if you can avoid it; you want to make one once, and then re-use it. But it's a bad idea to stash it away in a static because it's not threading safe!

This problem has been fixed in some versions of the *CLR*. In those versions, a new Random() now seeds itself randomly, rather than based on the current time.

Second, the arguments to $\[Next]$ are the minimum value produced, inclusive, and the maximum value produced, exclusive! This program produces random numbers drawn from 1, 2, 3, 4, 5. The correct way to get numbers from 1 to 6 is, of course, $\[Next(1, 7)\]$.

The *fundamental* problem here is that *we're working at too low a level of abstraction*. It is not the 1970s anymore when <code>rand()</code> was good enough. We have sophisticated problems in statistical modeling and the attendant probabilistic reasoning to solve in modern programming languages. We need to up our game by writing code in the "business domain" of probabilities, not the "mechanism domain" of calls to methods that return random numbers.

Implementation

Let's have a look at the basic **Random** class in C#:

Try running the code again and again to notice a change in output.



In the next chapter, we will start by simply improving the existing implementation of Random, but from that humble beginning, we'll develop a new class library that makes programming with probabilities much more

readable, powerful and efficient in C#.