

**NAME**

**rand**, **srand**, **rand\_r** - bad random number generator

**LIBRARY**

Standard C Library (libc, -lc)

**SYNOPSIS**

**#include** <stdlib.h>

*void*

**srand**(*unsigned seed*);

*int*

**rand**(*void*);

*int*

**rand\_r**(*unsigned \*ctx*);

**DESCRIPTION**

The functions described in this manual page are not cryptographically secure. Applications which require unpredictable random numbers should use **arc4random(3)** instead.

The **rand()** function computes a sequence of pseudo-random integers in the range of 0 to **RAND\_MAX**, inclusive.

The **srand()** function seeds the algorithm with the *seed* parameter. Repeatable sequences of **rand()** output may be obtained by calling **srand()** with the same *seed*. **rand()** is implicitly initialized as if **srand(1)** had been invoked explicitly.

In FreeBSD 13, **rand()** is implemented using the same 128-byte state LFSR generator algorithm as **random(3)**. However, the legacy **rand\_r()** function is not (and can not be, because of its limited *\*ctx* size). **rand\_r()** implements the historical, poor-quality Park-Miller 32-bit LCG and should not be used in new designs.

**IMPLEMENTATION NOTES**

Since FreeBSD 13, **rand()** is implemented with the same generator as **random(3)**, so the low-order bits should no longer be significantly worse than the high-order bits.

**SEE ALSO**

**arc4random(3)**, **random(3)**, **random(4)**

## STANDARDS

The **rand()** and **srand()** functions conform to ISO/IEC 9899:1990 ("ISO C90").

The **rand\_r()** function is not part of ISO/IEC 9899:1990 ("ISO C90") and is marked obsolescent in IEEE Std 1003.1-2008 ("POSIX.1"). It may be removed in a future revision of POSIX.

## CAVEATS

Prior to FreeBSD 13, **rand()** used the historical Park-Miller generator with 32 bits of state and produced poor quality output, especially in the lower bits. **rand()** in earlier versions of FreeBSD, as well as other standards-conforming implementations, may continue to produce poor quality output.

*These functions should not be used in portable applications that want a high quality or high performance pseudorandom number generator.* One possible replacement, `random(3)`, is portable to Linux -- but it is not especially fast, nor standardized.

If broader portability or better performance is desired, any of the widely available and permissively licensed SFC64/32, JSF64/32, PCG64/32, or SplitMix64 algorithm implementations may be embedded in your application. These algorithms have the benefit of requiring less space than `random(3)` and being quite fast (in header inline implementations).