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### ***Rocky Enterprise Linux 9.2 Manual Pages on command 'jrand48.3'***

***\$ man jrand48.3***

DRAND48(3)                      Linux Programmer's Manual                      DRAND48(3)

#### **NAME**

drand48, erand48, lrand48, nrand48, mrand48, jrand48, srand48, seed48, lcong48 - generate uniformly distributed pseudo-random numbers

#### **SYNOPSIS**

```
#include <stdlib.h>

double drand48(void);

double erand48(unsigned short xsubi[3]);

long lrand48(void);

long nrand48(unsigned short xsubi[3]);

long mrand48(void);

long jrand48(unsigned short xsubi[3]);

void srand48(long seedval);

unsigned short *seed48(unsigned short seed16v[3]);

void lcong48(unsigned short param[7]);
```

Feature Test Macro Requirements for glibc (see feature\_test\_macros(7)):

All functions shown above: `_XOPEN_SOURCE`

|| /\* Glibc since 2.19: \*/ `_DEFAULT_SOURCE`

|| /\* Glibc versions <= 2.19: \*/ `_SVID_SOURCE`

#### **DESCRIPTION**

These functions generate pseudo-random numbers using the linear congruential algorithm and 48-bit integer arithmetic.

The `drand48()` and `erand48()` functions return nonnegative double-precision floating-point

values uniformly distributed over the interval [0.0, 1.0).

The `lrand48()` and `nrand48()` functions return nonnegative long integers uniformly distributed over the interval  $[0, 2^{31})$ .

The `mrnd48()` and `jrand48()` functions return signed long integers uniformly distributed over the interval  $[-2^{31}, 2^{31})$ .

The `srand48()`, `seed48()`, and `lcong48()` functions are initialization functions, one of which should be called before using `drand48()`, `lrand48()` or `mrnd48()`. The functions `erand48()`, `nrand48()`, and `jrand48()` do not require an initialization function to be called first.

All the functions work by generating a sequence of 48-bit integers,  $X_i$ , according to the linear congruential formula:

$$X_{n+1} = (aX_n + c) \bmod m, \text{ where } n \geq 0$$

The parameter  $m = 2^{48}$ , hence 48-bit integer arithmetic is performed. Unless `lcong48()` is called,  $a$  and  $c$  are given by:

$$a = 0x5DEECE66D$$

$$c = 0xB$$

The value returned by any of the functions `drand48()`, `erand48()`, `lrand48()`, `nrand48()`, `mrnd48()` or `jrand48()` is computed by first generating the next 48-bit  $X_i$  in the sequence. Then the appropriate number of bits, according to the type of data item to be returned, is copied from the high-order bits of  $X_i$  and transformed into the returned value.

The functions `drand48()`, `lrand48()`, and `mrnd48()` store the last 48-bit  $X_i$  generated in an internal buffer. The functions `erand48()`, `nrand48()`, and `jrand48()` require the calling program to provide storage for the successive  $X_i$  values in the array argument `xsubi`. The functions are initialized by placing the initial value of  $X_i$  into the array before calling the function for the first time.

The initializer function `srand48()` sets the high order 32-bits of  $X_i$  to the argument `seedval`. The low order 16-bits are set to the arbitrary value `0x330E`.

The initializer function `seed48()` sets the value of  $X_i$  to the 48-bit value specified in the array argument `seed16v`. The previous value of  $X_i$  is copied into an internal buffer and a pointer to this buffer is returned by `seed48()`.

The initialization function `lcong48()` allows the user to specify initial values for  $X_i$ ,  $a$ , and  $c$ . Array argument elements `param[0-2]` specify  $X_i$ , `param[3-5]` specify  $a$ , and `param[6]` specifies  $c$ . After `lcong48()` has been called, a subsequent call to either `srand48()` or

seed48() will restore the standard values of a and c.

## ATTRIBUTES

For an explanation of the terms used in this section, see attributes(7).

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?Interface	? Attribute	? Value	?
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??

?drand48(), erand48(), ? Thread safety ? MT-Unsafe race:drand48 ?

?lrand48(), nrand48(), ?	?	?
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?mrand48(), jrand48(), ?	?	?
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?srand48(), seed48(), ?	?	?
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?lcong48()	?	?	?
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??

The above functions record global state information for the random number generator, so they are not thread-safe.

## CONFORMING TO

POSIX.1-2001, POSIX.1-2008, SVr4.

## SEE ALSO

rand(3), random(3)

## COLOPHON

This page is part of release 5.10 of the Linux man-pages project. A description of the project, information about reporting bugs, and the latest version of this page, can be found at <https://www.kernel.org/doc/man-pages/>.