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Rocky Enterprise Linux 9.2 Manual Pages on command 'BN_to_montgomery.3ossl'

\$ man BN_to_montgomery.3ossl

BN_MOD_MUL_MONTGOMERY(3ossl) OpenSSL BN_MOD_MUL_MONTGOMERY(3ossl)

NAME

BN_mod_mul_montgomery, BN_MONT_CTX_new, BN_MONT_CTX_free,
BN_MONT_CTX_set, BN_MONT_CTX_copy, BN_from_montgomery, BN_to_montgomery
- Montgomery multiplication

SYNOPSIS

```
#include <openssl/bn.h>
```

```
BN_MONT_CTX *BN_MONT_CTX_new(void);
```

```
void BN_MONT_CTX_free(BN_MONT_CTX *mont);
```

```
int BN_MONT_CTX_set(BN_MONT_CTX *mont, const BIGNUM *m, BN_CTX *ctx);
```

```
BN_MONT_CTX *BN_MONT_CTX_copy(BN_MONT_CTX *to, BN_MONT_CTX *from);
```

```
int BN_mod_mul_montgomery(BIGNUM *r, BIGNUM *a, BIGNUM *b,
```

```
BN_MONT_CTX *mont, BN_CTX *ctx);
```

```
int BN_from_montgomery(BIGNUM *r, BIGNUM *a, BN_MONT_CTX *mont,  
    BN_CTX *ctx);
```

```
int BN_to_montgomery(BIGNUM *r, BIGNUM *a, BN_MONT_CTX *mont,  
    BN_CTX *ctx);
```

DESCRIPTION

These functions implement Montgomery multiplication. They are used automatically when `BN_mod_exp(3)` is called with suitable input, but they may be useful when several operations are to be performed using the same modulus.

`BN_MONT_CTX_new()` allocates and initializes a `BN_MONT_CTX` structure.

`BN_MONT_CTX_set()` sets up the mont structure from the modulus `m` by precomputing its inverse and a value `R`.

`BN_MONT_CTX_copy()` copies the `BN_MONT_CTX` from to to.

`BN_MONT_CTX_free()` frees the components of the `BN_MONT_CTX`, and, if it was created by `BN_MONT_CTX_new()`, also the structure itself. If `mont` is `NULL`, nothing is done.

`BN_mod_mul_montgomery()` computes $\text{Mont}(a,b) := a * b * R^{-1}$ and places the result in `r`.

`BN_from_montgomery()` performs the Montgomery reduction $r = a * R^{-1}$.

`BN_to_montgomery()` computes $\text{Mont}(a, R^2)$, i.e. $a * R$. Note that `a` must be nonnegative and smaller than the modulus.

For all functions, `ctx` is a previously allocated `BN_CTX` used for

temporary variables.

RETURN VALUES

`BN_MONT_CTX_new()` returns the newly allocated `BN_MONT_CTX`, and `NULL` on error.

`BN_MONT_CTX_free()` has no return value.

For the other functions, 1 is returned for success, 0 on error. The error codes can be obtained by `ERR_get_error(3)`.

WARNINGS

The inputs must be reduced modulo `m`, otherwise the result will be outside the expected range.

SEE ALSO

`ERR_get_error(3)`, `BN_add(3)`, `BN_CTX_new(3)`

HISTORY

`BN_MONT_CTX_init()` was removed in OpenSSL 1.1.0

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