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Red Hat Enterprise Linux Release 9.2 Manual Pages on 'provider-digest.7oss1' command

\$ man provider-digest.7oss1

PROVIDER-DIGEST(7oss1) OpenSSL PROVIDER-DIGEST(7oss1)

NAME

provider-digest - The digest library <-> provider functions

SYNOPSIS

```
#include <openssl/core_dispatch.h>
#include <openssl/core_names.h>
/*
 * Digests support the following function signatures in OSSL_DISPATCH arrays.
 * (The function signatures are not actual functions).
 */
/* Context management */
void *OSSL_FUNC_digest_newctx(void *provctx);
void OSSL_FUNC_digest_freectx(void *dctx);
void *OSSL_FUNC_digest_dupctx(void *dctx);
/* Digest generation */
int OSSL_FUNC_digest_init(void *dctx, const OSSL_PARAM params[]);
int OSSL_FUNC_digest_update(void *dctx, const unsigned char *in, size_t inl);
int OSSL_FUNC_digest_final(void *dctx, unsigned char *out, size_t *outl,
                           size_t outsz);
int OSSL_FUNC_digest_digest(void *provctx, const unsigned char *in, size_t inl,
                            unsigned char *out, size_t *outl, size_t outsz);
/* Digest parameter descriptors */
const OSSL_PARAM *OSSL_FUNC_digest_gettable_params(void *provctx);
```

```

/* Digest operation parameter descriptors */
const OSSL_PARAM *OSSL_FUNC_digest_gettable_ctx_params(void *dctx,
                                                       void *provctx);
const OSSL_PARAM *OSSL_FUNC_digest_settable_ctx_params(void *dctx,
                                                       void *provctx);

/* Digest parameters */
int OSSL_FUNC_digest_get_params(OSSL_PARAM params[]);
/* Digest operation parameters */
int OSSL_FUNC_digest_set_ctx_params(void *dctx, const OSSL_PARAM params[]);
int OSSL_FUNC_digest_get_ctx_params(void *dctx, OSSL_PARAM params[]);

```

DESCRIPTION

This documentation is primarily aimed at provider authors. See [provider\(7\)](#) for further information.

The DIGEST operation enables providers to implement digest algorithms and make them available to applications via the API functions [EVP_DigestInit_ex\(3\)](#), [EVP_DigestUpdate\(3\)](#) and [EVP_DigestFinal\(3\)](#) (and other related functions).

All "functions" mentioned here are passed as function pointers between libcrypto and the provider in `OSSL_DISPATCH` arrays via `OSSL_ALGORITHM` arrays that are returned by the provider's `provider_query_operation()` function (see "Provider Functions" in [provider-base\(7\)](#)).

All these "functions" have a corresponding function type definition named `OSSL_FUNC_{name}_fn`, and a helper function to retrieve the function pointer from an `OSSL_DISPATCH` element named `OSSL_FUNC_{name}`.

For example, the "function" `OSSL_FUNC_digest_newctx()` has these:

```

typedef void *(OSSL_FUNC_digest_newctx_fn)(void *provctx);
static ossl_inline OSSL_FUNC_digest_newctx_fn
    OSSL_FUNC_digest_newctx(const OSSL_DISPATCH *opf);

```

`OSSL_DISPATCH` arrays are indexed by numbers that are provided as macros in [openssl-core_dispatch.h\(7\)](#), as follows:

```

OSSL_FUNC_digest_newctx      OSSL_FUNC_DIGEST_NEWCTX
OSSL_FUNC_digest_freectx     OSSL_FUNC_DIGEST_FREETX
OSSL_FUNC_digest_dupctx      OSSL_FUNC_DIGEST_DUPCTX

```

OSSL_FUNC_digest_init	OSSL_FUNC_DIGEST_INIT
OSSL_FUNC_digest_update	OSSL_FUNC_DIGEST_UPDATE
OSSL_FUNC_digest_final	OSSL_FUNC_DIGEST_FINAL
OSSL_FUNC_digest_digest	OSSL_FUNC_DIGEST_DIGEST
OSSL_FUNC_digest_get_params	OSSL_FUNC_DIGEST_GET_PARAMS
OSSL_FUNC_digest_get_ctx_params	OSSL_FUNC_DIGEST_GET_CTX_PARAMS
OSSL_FUNC_digest_set_ctx_params	OSSL_FUNC_DIGEST_SET_CTX_PARAMS
OSSL_FUNC_digest_gettable_params	OSSL_FUNC_DIGEST_GETTABLE_PARAMS
OSSL_FUNC_digest_gettable_ctx_params	OSSL_FUNC_DIGEST_GETTABLE_CTX_PARAMS
OSSL_FUNC_digest_settable_ctx_params	OSSL_FUNC_DIGEST_SETTABLE_CTX_PARAMS

A digest algorithm implementation may not implement all of these

functions. In order to be usable all or none of

OSSL_FUNC_digest_newctx, OSSL_FUNC_digest_freectx,

OSSL_FUNC_digest_init, OSSL_FUNC_digest_update and

OSSL_FUNC_digest_final should be implemented. All other functions are optional.

Context Management Functions

OSSL_FUNC_digest_newctx() should create and return a pointer to a provider side structure for holding context information during a digest operation. A pointer to this context will be passed back in a number of the other digest operation function calls. The parameter provctx is the provider context generated during provider initialisation (see provider(7)).

OSSL_FUNC_digest_freectx() is passed a pointer to the provider side digest context in the dctx parameter. This function should free any resources associated with that context.

OSSL_FUNC_digest_dupctx() should duplicate the provider side digest context in the dctx parameter and return the duplicate copy.

Digest Generation Functions

OSSL_FUNC_digest_init() initialises a digest operation given a newly created provider side digest context in the dctx parameter. The params, if not NULL, should be set on the context in a manner similar to using OSSL_FUNC_digest_set_ctx_params().

OSSL_FUNC_digest_update() is called to supply data to be digested as part of a previously initialised digest operation. The dctx parameter contains a pointer to a previously initialised provider side context.

OSSL_FUNC_digest_update() should digest inl bytes of data at the location pointed to by in. OSSL_FUNC_digest_update() may be called multiple times for a single digest operation.

OSSL_FUNC_digest_final() generates a digest started through previous OSSL_FUNC_digest_init() and OSSL_FUNC_digest_update() calls. The dctx parameter contains a pointer to the provider side context. The digest should be written to *out and the length of the digest to *outl. The digest should not exceed outsz bytes.

OSSL_FUNC_digest_digest() is a "oneshot" digest function. No provider side digest context is used. Instead the provider context that was created during provider initialisation is passed in the provctx parameter (see provider(7)). inl bytes at in should be digested and the result should be stored at out. The length of the digest should be stored in *outl which should not exceed outsz bytes.

Digest Parameters

See OSSL_PARAM(3) for further details on the parameters structure used by these functions.

OSSL_FUNC_digest_get_params() gets details of the algorithm implementation and stores them in params.

OSSL_FUNC_digest_set_ctx_params() sets digest operation parameters for the provider side digest context dctx to params. Any parameter settings are additional to any that were previously set. Passing NULL for params should return true.

OSSL_FUNC_digest_get_ctx_params() gets digest operation details details from the given provider side digest context dctx and stores them in params. Passing NULL for params should return true.

OSSL_FUNC_digest_gettable_params() returns a constant OSSL_PARAM array containing descriptors of the parameters that

OSSL_FUNC_digest_get_params() can handle.

OSSL_FUNC_digest_gettable_ctx_params() and

OSSL_FUNC_digest_settable_ctx_params() both return constant OSSL_PARAM

arrays as descriptors of the parameters that

OSSL_FUNC_digest_get_ctx_params() and OSSL_FUNC_digest_set_ctx_params()

can handle, respectively. The array is based on the current state of

the provider side context if dctx is not NULL and on the provider side

algorithm provctx otherwise.

Parameters currently recognised by built-in digests with this function

are as follows. Not all parameters are relevant to, or are understood

by all digests:

"blocksize" (OSSL_DIGEST_PARAM_BLOCK_SIZE) <unsigned integer>

The digest block size. The length of the "blocksize" parameter

should not exceed that of a size_t.

"size" (OSSL_DIGEST_PARAM_SIZE) <unsigned integer>

The digest output size. The length of the "size" parameter should

not exceed that of a size_t.

"flags" (OSSL_DIGEST_PARAM_FLAGS) <unsigned integer>

Diverse flags that describe exceptional behaviour for the digest:

EVP_MD_FLAG_ONESHOT

This digest method can only handle one block of input.

EVP_MD_FLAG_XOF

This digest method is an extensible-output function (XOF) and

supports setting the OSSL_DIGEST_PARAM_XOFLEN parameter.

EVP_MD_FLAG_DIGALGID_NULL

When setting up a DigestAlgorithmIdentifier, this flag will

have the parameter set to NULL by default. Use this for

PKCS#1. Note: if combined with EVP_MD_FLAG_DIGALGID_ABSENT,

the latter will override.

EVP_MD_FLAG_DIGALGID_ABSENT

When setting up a DigestAlgorithmIdentifier, this flag will

have the parameter be left absent by default. Note: if

combined with EVP_MD_FLAG_DIGALGID_NULL, the latter will be

overridden.

EVP_MD_FLAG_DIGALGID_CUSTOM

Custom DigestAlgorithmIdentifier handling via ctrl, with
EVP_MD_FLAG_DIGALGID_ABSENT as default. Note: if combined with
EVP_MD_FLAG_DIGALGID_NULL, the latter will be overridden.
Currently unused.

The length of the "flags" parameter should equal that of an
unsigned long int.

Digest Context Parameters

OSSL_FUNC_digest_set_ctx_params() sets digest parameters associated
with the given provider side digest context dctx to params. Any
parameter settings are additional to any that were previously set. See
OSSL_PARAM(3) for further details on the parameters structure.
OSSL_FUNC_digest_get_ctx_params() gets details of currently set
parameters values associated with the give provider side digest context
dctx and stores them in params. See OSSL_PARAM(3) for further details
on the parameters structure.

RETURN VALUES

OSSL_FUNC_digest_newctx() and OSSL_FUNC_digest_dupctx() should return
the newly created provider side digest context, or NULL on failure.
OSSL_FUNC_digest_init(), OSSL_FUNC_digest_update(),
OSSL_FUNC_digest_final(), OSSL_FUNC_digest_digest(),
OSSL_FUNC_digest_set_params() and OSSL_FUNC_digest_get_params() should
return 1 for success or 0 on error.
OSSL_FUNC_digest_size() should return the digest size.
OSSL_FUNC_digest_block_size() should return the block size of the
underlying digest algorithm.

BUGS

The EVP_Q_digest(), EVP_Digest() and EVP_DigestFinal_ex() API calls do
not expect the digest size to be larger than EVP_MAX_MD_SIZE. Any
algorithm which produces larger digests is unusable with those API
calls.

SEE ALSO

provider(7), OSSL_PROVIDER-FIPS(7), OSSL_PROVIDER-default(7),
OSSL_PROVIDER-legacy(7), EVP_MD-common(7), EVP_MD-BLAKE2(7),

EVP_MD-MD2(7), EVP_MD-MD4(7), EVP_MD-MD5(7), EVP_MD-MD5-SHA1(7),
EVP_MD-MDC2(7), EVP_MD-RIPEMD160(7), EVP_MD-SHA1(7), EVP_MD-SHA2(7),
EVP_MD-SHA3(7), EVP_MD-SHAKE(7), EVP_MD-SM3(7), EVP_MD-WHIRLPOOL(7),
life_cycle-digest(7), EVP_DigestInit(3)

HISTORY

The provider DIGEST interface was introduced in OpenSSL 3.0.

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