

**NAME**

**cgetent**, **cgetset**, **cgetmatch**, **cgetcap**, **cgetnum**, **cgetstr**, **cgetustr**, **cgetfirst**, **cgetnext**, **cgetclose** - capability database access routines

**LIBRARY**

Standard C Library (libc, -lc)

**SYNOPSIS**

```
#include <stdlib.h>
```

*int*

```
cgetent(char **buf, char **db_array, const char *name);
```

*int*

```
cgetset(const char *ent);
```

*int*

```
cgetmatch(const char *buf, const char *name);
```

*char \**

```
cgetcap(char *buf, const char *cap, int type);
```

*int*

```
cgetnum(char *buf, const char *cap, long *num);
```

*int*

```
cgetstr(char *buf, const char *cap, char **str);
```

*int*

```
cgetustr(char *buf, const char *cap, char **str);
```

*int*

```
cgetfirst(char **buf, char **db_array);
```

*int*

```
cgetnext(char **buf, char **db_array);
```

*int*

```
cgetclose(void);
```

## DESCRIPTION

The **cgetent()** function extracts the capability *name* from the database specified by the NULL terminated file array *db\_array* and returns a pointer to a malloc(3)'d copy of it in *buf*. The **cgetent()** function will first look for files ending in *.db* (see **cap\_mkdb(1)**) before accessing the ASCII file. The *buf* argument must be retained through all subsequent calls to **cgetmatch()**, **cgetcap()**, **cgetnum()**, **cgetstr()**, and **cgetustr()**, but may then be free(3)'d. On success 0 is returned, 1 if the returned record contains an unresolved **tc** expansion, -1 if the requested record could not be found, -2 if a system error was encountered (could not open/read a file, etc.) also setting *errno*, and -3 if a potential reference loop is detected (see **tc=** comments below).

The **cgetset()** function enables the addition of a character buffer containing a single capability record entry to the capability database. Conceptually, the entry is added as the first "file" in the database, and is therefore searched first on the call to **cgetent()**. The entry is passed in *ent*. If *ent* is NULL, the current entry is removed from the database. A call to **cgetset()** must precede the database traversal. It must be called before the **cgetent()** call. If a sequential access is being performed (see below), it must be called before the first sequential access call (**cgetfirst()** or **cgetnext()**), or be directly preceded by a **cgetclose()** call. On success 0 is returned and -1 on failure.

The **cgetmatch()** function will return 0 if *name* is one of the names of the capability record *buf*, -1 if not.

The **cgetcap()** function searches the capability record *buf* for the capability *cap* with type *type*. A *type* is specified using any single character. If a colon (':') is used, an untyped capability will be searched for (see below for explanation of types). A pointer to the value of *cap* in *buf* is returned on success, NULL if the requested capability could not be found. The end of the capability value is signaled by a ':' or ASCII NUL (see below for capability database syntax).

The **cgetnum()** function retrieves the value of the numeric capability *cap* from the capability record pointed to by *buf*. The numeric value is returned in the *long* pointed to by *num*. 0 is returned on success, -1 if the requested numeric capability could not be found.

The **cgetstr()** function retrieves the value of the string capability *cap* from the capability record pointed to by *buf*. A pointer to a decoded, NUL terminated, malloc(3)'d copy of the string is returned in the *char \** pointed to by *str*. The number of characters in the decoded string not including the trailing NUL is returned on success, -1 if the requested string capability could not be found, -2 if a system error was encountered (storage allocation failure).

The **cgetustr()** function is identical to **cgetstr()** except that it does not expand special characters, but rather returns each character of the capability string literally.

The **cgetfirst()** and **cgetnext()** functions comprise a function group that provides for sequential access of

the NULL pointer terminated array of file names, *db\_array*. The **cgetfirst()** function returns the first record in the database and resets the access to the first record. The **cgetnext()** function returns the next record in the database with respect to the record returned by the previous **cgetfirst()** or **cgetnext()** call. If there is no such previous call, the first record in the database is returned. Each record is returned in a `malloc(3)`'d copy pointed to by *buf*. **Tc** expansion is done (see **tc=** comments below). Upon completion of the database 0 is returned, 1 is returned upon successful return of record with possibly more remaining (we have not reached the end of the database yet), 2 is returned if the record contains an unresolved **tc** expansion, -1 is returned if a system error occurred, and -2 is returned if a potential reference loop is detected (see **tc=** comments below). Upon completion of database (0 return) the database is closed.

The **cgetclose()** function closes the sequential access and frees any memory and file descriptors being used. Note that it does not erase the buffer pushed by a call to **cgetset()**.

### CAPABILITY DATABASE SYNTAX

Capability databases are normally ASCII and may be edited with standard text editors. Blank lines and lines beginning with a '#' are comments and are ignored. Lines ending with a '\' indicate that the next line is a continuation of the current line; the '\' and following newline are ignored. Long lines are usually continued onto several physical lines by ending each line except the last with a '\'.

Capability databases consist of a series of records, one per logical line. Each record contains a variable number of ':'-separated fields (capabilities). Empty fields consisting entirely of white space characters (spaces and tabs) are ignored.

The first capability of each record specifies its names, separated by '|' characters. These names are used to reference records in the database. By convention, the last name is usually a comment and is not intended as a lookup tag. For example, the *vt100* record from the `termcap(5)` database begins:

```
d0|vt100|vt100-am|vt100am|dec vt100:
```

giving four names that can be used to access the record.

The remaining non-empty capabilities describe a set of (name, value) bindings, consisting of a names optionally followed by a typed value:

```
name          typeless [boolean] capability name is present [true]
nameTvalue    capability (name, T) has value value
name@         no capability name exists
nameT@       capability (name, T) does not exist
```

Names consist of one or more characters. Names may contain any character except ‘:’, but it is usually best to restrict them to the printable characters and avoid use of graphics like ‘#’, ‘=’, ‘%’, ‘@’, etc. Types are single characters used to separate capability names from their associated typed values. Types may be any character except a ‘:’. Typically, graphics like ‘#’, ‘=’, ‘%’, etc. are used. Values may be any number of characters and may contain any character except ‘:’.

## CAPABILITY DATABASE SEMANTICS

Capability records describe a set of (name, value) bindings. Names may have multiple values bound to them. Different values for a name are distinguished by their *types*. The **cgetcap()** function will return a pointer to a value of a name given the capability name and the type of the value.

The types ‘#’ and ‘=’ are conventionally used to denote numeric and string typed values, but no restriction on those types is enforced. The functions **cgetnum()** and **cgetstr()** can be used to implement the traditional syntax and semantics of ‘#’ and ‘=’. Typeless capabilities are typically used to denote boolean objects with presence or absence indicating truth and false values respectively. This interpretation is conveniently represented by:

```
(getcap(buf, name, ':') != NULL)
```

A special capability, **tc= name**, is used to indicate that the record specified by *name* should be substituted for the **tc** capability. **Tc** capabilities may interpolate records which also contain **tc** capabilities and more than one **tc** capability may be used in a record. A **tc** expansion scope (i.e., where the argument is searched for) contains the file in which the **tc** is declared and all subsequent files in the file array.

When a database is searched for a capability record, the first matching record in the search is returned. When a record is scanned for a capability, the first matching capability is returned; the capability **:nameT@:** will hide any following definition of a value of type *T* for *name*; and the capability **:name@:** will prevent any following values of *name* from being seen.

These features combined with **tc** capabilities can be used to generate variations of other databases and records by either adding new capabilities, overriding definitions with new definitions, or hiding following definitions via ‘@’ capabilities.

## EXAMPLES

```
example|an example of binding multiple values to names:\
:foo%bar:foo^blah:foo@:\
:abc%xyz:abc^frap:abc$@:\
:tc=more:
```

The capability `foo` has two values bound to it (`bar` of type `'%'` and `blah` of type `'^'`) and any other value bindings are hidden. The capability `abc` also has two values bound but only a value of type `'$'` is prevented from being defined in the capability record more.

```
file1:
    new|new_record|a modification of "old":\
        :fript=bar:who-cares@:tc=old:blah:tc=extensions:
file2:
    old|old_record|an old database record:\
        :fript=foo:who-cares:glork#200:
```

The records are extracted by calling `cgetent()` with `file1` preceding `file2`. In the capability record `new` in `file1`, `fript=bar` overrides the definition of `fript=foo` interpolated from the capability record `old` in `file2`, `who-cares@` prevents the definition of any `who-cares` definitions in `old` from being seen, `glork#200` is inherited from `old`, and `blah` and anything defined by the record extensions is added to those definitions in `old`. Note that the position of the `fript=bar` and `who-cares@` definitions before `tc=old` is important here. If they were after, the definitions in `old` would take precedence.

## CGETNUM AND CGETSTR SYNTAX AND SEMANTICS

Two types are predefined by `cgetnum()` and `cgetstr()`:

```
name#number  numeric capability name has value number
name=string  string capability name has value string
name#@       the numeric capability name does not exist
name=@       the string capability name does not exist
```

Numeric capability values may be given in one of three numeric bases. If the number starts with either `'0x'` or `'0X'` it is interpreted as a hexadecimal number (both upper and lower case a-f may be used to denote the extended hexadecimal digits). Otherwise, if the number starts with a `'0'` it is interpreted as an octal number. Otherwise the number is interpreted as a decimal number.

String capability values may contain any character. Non-printable ASCII codes, new lines, and colons may be conveniently represented by the use of escape sequences:

```
^X      ('X' & 037)    control-X
\b, \B  (ASCII 010)   backspace
\t, \T  (ASCII 011)   tab
\n, \N  (ASCII 012)   line feed (newline)
\f, \F  (ASCII 014)   form feed
\r, \R  (ASCII 015)   carriage return
```

<code>\e, \E</code>	(ASCII 027)	escape
<code>\c, \C</code>	(:)	colon
<code>\\</code>	(\)	back slash
<code>\^</code>	(^)	caret
<code>\nnn</code>	(ASCII octal nnn)	

A `\` may be followed by up to three octal digits directly specifies the numeric code for a character. The use of ASCII NULs, while easily encoded, causes all sorts of problems and must be used with care since NULs are typically used to denote the end of strings; many applications use `\"200` to represent a NUL.

## DIAGNOSTICS

The `cgetent()`, `cgetset()`, `cgetmatch()`, `cgetnum()`, `cgetstr()`, `cgetustr()`, `cgetfirst()`, and `cgetnext()` functions return a value greater than or equal to 0 on success and a value less than 0 on failure. The `cgetcap()` function returns a character pointer on success and a NULL on failure.

The `cgetent()`, and `cgetset()` functions may fail and set *errno* for any of the errors specified for the library functions: `fopen(3)`, `fclose(3)`, `open(2)`, and `close(2)`.

The `cgetent()`, `cgetset()`, `cgetstr()`, and `cgetustr()` functions may fail and set *errno* as follows:

[ENOMEM]           No memory to allocate.

## SEE ALSO

`cap_mkdb(1)`, `malloc(3)`

## BUGS

Colons (':') cannot be used in names, types, or values.

There are no checks for **tc=name** loops in `cgetent()`.

The buffer added to the database by a call to `cgetset()` is not unique to the database but is rather prepended to any database used.