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# What are carriage return, linefeed, and form feed?

Asked 9 years, 3 months ago   Active 2 years, 3 months ago   Viewed 447k times



452



212

What is the meaning of the following control characters:

1. Carriage return
2. Line feed
3. Form feed

newline

carriage-return

linefeed

control-characters

ansi-escape

edited Sep 10 '14 at 10:33



legends2k

20.4k

17

85

167

asked Jun 22 '10 at 8:40



ashna

2,521

4

16

8

8 What does "carriage return" mean? I don't see any "carriage" "returning" on my laptop. :s – [Jean Hominal](#) Jun 22 '10 at 8:43

5 @JeanHominal the carriage basically means the cursor (or the pointer in ancient typewriters), and return means to return to the beginning of that line. – [SOFe](#) Aug 9 '16 at 7:39

I do not see any wires terminated (or any glass panes for that matter) in my "terminal" "window", nor is there a "teletype" attached to /dev/tty1. They've all become metaphors. – [Piskvor](#) Mar 26 at 16:34

## 11 Answers



Carriage return means to return to the beginning of the current line without advancing downward. The name comes from a printer's carriage, as monitors were rare when the name was coined. This is commonly escaped as "\r", abbreviated CR, and has ASCII value 13

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Linefeed means to advance downward to the next line; however, it has been repurposed and renamed. Used as "newline", it *terminates* lines (commonly confused with *separating* lines). This is commonly escaped as "\n", abbreviated LF or NL, and has ASCII value 10 or 0x0A. CRLF (but not CRNL) is used for the pair "\r\n".

Form feed means advance downward to the next "page". It was commonly used as page separators, but now is also used as section separators. (It's uncommonly used in source code to divide logically independent functions or groups of functions.) Text editors can use this character when you "insert a page break". This is commonly escaped as "\f", abbreviated FF, and has ASCII value 12 or 0x0C.

As control characters, they may be interpreted in various ways.

The most common difference (and probably the only one worth worrying about) is lines end with CRLF on Windows, NL on Unix-likes, and CR on older Macs (the situation has changed with OS X to be like Unix). Note the shift in meaning from LF to NL, for the exact same character, gives the differences between Windows and Unix. (Windows is, of course, newer than Unix, so it didn't adopt this semantic shift. I don't know the history of Macs using CR.) Many text editors can read files in any of these three formats and convert between them, but not all utilities can.

Form feed is a bit more interesting (even though less commonly used directly), and with the usual definition of page separator, it can only come between lines (e.g. after the newline sequence of NL, CRLF, or CR) or at the start or end of the file.

edited Jun 21 '17 at 9:26

answered Jun 23 '10 at 1:28



Eric O Lebigot

60.4k 38 175 226

Roger Pate

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10 I can confirm that [OS X](#) uses NL as a line terminator, just like Unix (because OS X *is* a Unix). CR was used in [Mac OS 9](#) and below. – [Rory O'Kane](#) Aug 16 '13 at 15:51

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1 The FF char may seem strange today (along with the "CTRL-G" bell char) but it had more relevance back when video displays were far less common and hard copy terminals were used as data displays. – [Rick Sarvas](#) Nov 27 '13 at 15:11

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Isn't that feed control \x0c ? – [Tjorriemorrie](#) Jul 1 '15 at 7:29

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2 "I don't know the history of Macs using CR." That probably came from the Apple II using CR. CR was common on other 8-bit systems, too, like the Commodore and Tandy. ASCII wasn't universal on these systems: Commodore used PETSCII, which had LF at 0x8d (!). Atari had no LF character at all. For whatever reason, CR = 0x0d was more-or-less standard. – [Ssswift](#) Oct 18 '17 at 6:40

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▲ \r is carriage return and moves the cursor back like if i will do-

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means it has shifted the cursor to the beginning of "stackoverflow" and overwrites the starting four characters since "nine" is four character long.

`\n` is new line character which changes the line and takes the cursor to the beginning of a new line like-

```
printf("stackoverflow\nnine")
stackoverflow
nine
```

`\f` is form feed, its use has become obsolete but it is used for giving indentation like

```
printf("stackoverflow\fnine")
stackoverflow
    nine
```

if i will write like-

```
printf("stackoverflow\fnine\fgreat")
stackoverflow
    nine
        great
```

edited Feb 13 '16 at 3:42



e0k

5,321

2

14

27

answered Feb 13 '16 at 1:50



user3346547

1,069

1

7

2

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1 But this example doesn't work in high level languages ! – [JINA KARVANDI](#) Oct 27 '16 at 20:08

@JINAKARVANDI it does: you can at least do the same in Linux shell using `printf` utility from coreutils. Or even using `echo -en` which is a bash builtin. – [Ruslan](#) May 10 '17 at 17:13

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How to pass all lines as one single line in a file? – [Paras Singh](#) Jan 19 '18 at 10:11

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2 Form feed is not used for indentation. If you send few of those to a printer it'll spit out paper. What you've described as `\f` is actually `\v` - a vertical tab, granted both look the same in the console. – [cprn](#) Jan 8 at 23:38

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`printf("123\f456\f789");` shows `/><bold>123456789</bold>` on console. – [Mayur](#) Feb 27 at 6:02

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Have a look at [Wikipedia](#):

25

Systems based on ASCII or a compatible character set use either LF (Line feed, '\n', 0x0A, 10 in decimal) or CR (Carriage return, '\r', 0x0D, 13 in decimal) individually, or CR followed by LF (CR+LF, 0x0D 0x0A). These characters are based on printer commands: The line feed indicated that one line of paper should feed out of the printer, and a carriage return indicated that the printer carriage should return to the beginning of the current line.

edited Jun 23 '10 at 1:15

Roger Pate

answered Jun 22 '10 at 8:42



[tanascius](#)

44k 15 104 127

24

\f is used for page break. You cannot see any effect in the console. But when you use this character constant in your file then you can see the difference.

Other example is that if you can redirect your output to a file then you don't have to write a file or use file handling.

For ex:

Write this code in c++

```
void main()
{
    clrscr();
    cout<<"helloooooo" ;

    cout<<"\f";
    cout<<"hiiii" ;

}
```

and when you compile this it generate an exe(for ex. abc.exe )

then you can redirect your output to a file using this:

```
abc > xyz.doc
```

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Kent Pawar

1,088 2 13 31



Balram Dixit

357 3 5

21

Apart from above information, there is still an interesting history of LF (\n) and CR (\r). [Original author : 阮一峰 Source : [http://www.ruanyifeng.com/blog/2006/04/post\\_213.html](http://www.ruanyifeng.com/blog/2006/04/post_213.html)] Before computer came out, there was a type of teleprinter called Teletype Model 33. It can print 10 characters each second. But there is one problem with this, after finishing printing each line, it will take 0.2 second to move to next line, which is time of printing 2 characters. If a new characters is transferred during this 0.2 second, then this new character will be lost.

So scientists found a way to solve this problem, they add two ending characters after each line, one is 'Carriage return', which is to tell the printer to bring the print head to the left.; the other one is 'Line feed', it tells the printer to move the paper up 1 line.

Later, computer became popular, these two concepts are used on computers. At that time, the storage device was very expensive, so some scientists said that it was expensive to add two characters at the end of each line, one is enough, so there are some arguments about which one to use.

In UNIX/Mac and Linux, '\n' is put at the end of each line, in Windows, '\r\n' is put at the end of each line. The consequence of this use is that files in UNIX/Mac will be displayed in one line if opened in Windows. While file in Windows will have one ^M at the end of each line if opened in UNIX or Mac.

edited May 20 '16 at 20:23

answered Jul 9 '15 at 9:52



miken32

27.3k 10 54 77



wxie

422 4 10

1 With the release of OSX (based on BSD unix), the Mac switched to '\n' - Unix line endings. – Jonathan Cross Mar 19 '16 at 9:25

"Files in UNIX/Mac will be displayed in one line if opened in Windows." WRITE.EXE (aka Wordpad) can display them just fine. – thecarpy Dec 8 '17 at 14:17

18

On old paper-printer terminals, advancing to the next line involved two actions: moving the print head back to the beginning of the horizontal scan range (carriage return) and advancing the roll of paper being printed on (line feed).

Since we no longer use paper-printer terminals, those actions aren't really relevant anymore, but the characters used to signal them have stuck around in various incarnations

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Amber

380k

62

555

501

Actually 'carriage return' does not move the print head to the left, but moves the carriage which holds the platen to the right. There used to be a long lever that was actuated by the left hand to do this. See [en.wikipedia.org/wiki/Typewriter](https://en.wikipedia.org/wiki/Typewriter) – Mark Lakata Nov 6 '12 at 22:09

- 2 @MarkLakata True for typewriters, but this answer is about old printing terminals. For example, the DEC LA36 ([columbia.edu/cu/computinghistory/la36.html](https://columbia.edu/cu/computinghistory/la36.html)). – Peter Cardona Aug 23 '13 at 21:18

12

Consider an IBM 1403 impact printer. CR moved the print head to the start of the line, but did NOT advance the paper. This allowed for "overprinting", placing multiple lines of output on one line. Things like underlining were achieved this way, as was BOLD print. LF advanced the paper one line. If there was no CR, the next line would print as a staggered-step because LF didn't move the print head. FF advanced the paper to the next page. It typically also moved the print head to the start of the first line on the new page, but you might need CR for that. To be sure, most programmers coded CRFF instead of CRLF at the end of the last line on a page because an extra CR created by FF wouldn't matter.

edited Feb 5 '14 at 5:12

answered Feb 5 '14 at 4:58



Dick Guertin

566

5

8

This is the only answer that explains the full meaning of carriage return. – Lee Aug 13 at 13:01

8

As a supplement,

- 1, **Carriage return**: It's a printer terminology meaning changing the print location to the beginning of **current** line. In computer world, it means return to the beginning of current line in most cases but stands for new line rarely.
- 2, **Line feed**: It's a printer terminology meaning advancing the paper one line. So Carriage return and Line feed are used together to start to print at the beginning of a new line. In computer world, it generally has the same meaning as newline.
- 3, **Form feed**: It's a printer terminology, I like the explanation in [this thread](#).

If you were programming for a 1980s style printer, it would eject the paper and start a new page. You are virtually certain to never

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[http://en.wikipedia.org/wiki/Form\\_feed](http://en.wikipedia.org/wiki/Form_feed)

It's almost obsolete and you can refer to [Escape sequence \f - form feed - what exactly is it?](#) for detailed explanation.

Note, we can use CR or LF or CRLF to stand for newline in some platforms but newline can't be stood by them in some other platforms. Refer to [wiki Newline](#) for details.

LF: Multics, Unix and Unix-like systems (Linux, OS X, FreeBSD, AIX, Xenix, etc.), BeOS, Amiga, RISC OS, and others

CR: Commodore 8-bit machines, Acorn BBC, ZX Spectrum, TRS-80, Apple II family, Oberon, the classic Mac OS up to version 9, MIT Lisp Machine and OS-9

RS: QNX pre-POSIX implementation

0x9B: Atari 8-bit machines using ATASCII variant of ASCII (155 in decimal)

CR+LF: Microsoft Windows, DOS (MS-DOS, PC DOS, etc.), DEC TOPS-10, RT-11, CP/M, MP/M, Atari TOS, OS/2, Symbian OS, Palm OS, Amstrad CPC, and most other early non-Unix and non-IBM OSes

LF+CR: Acorn BBC and RISC OS spooled text output.

edited May 23 '17 at 12:10



Community ♦

1 1

answered Oct 18 '16 at 8:12



Gearon

5,532 3 22 41

3 ▲ "n" is the linefeed character. It means end the present line and go to a new line for anyone who is reading it.

3



answered Jun 22 '10 at 8:42



vpit3833

7,025 2 19 24

▲ Carriage return and line feed are also references to typewriters, in that the with a small push on the handle on the left side of the carriage (the place where the paper goes), the paper would rotate a small amount around the cylinder, advancing the document one

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answered Jan 18 '14 at 21:11

[TheLastWordSword](#)

31 3



2



Those are non-printing characters, relating to the concept of "new line". `\n` is linefeed. `\r` is carriage return. On different platforms they have different meanings, relative to a valid new line. In windows, a new line is `\r\n`. In linux, `\n`. In mac, `\r`.

In practice, you put them in any string, and it will have effect on the print-out of the string.

answered Jun 22 '10 at 8:46

[Palantir](#)

18.9k 8 68 82