

## Walkies

Your program will animate a single character back and forth across the terminal in such a way that it appears to walk. OK, tumble across the screen might be more correct but then titling this page *Tumbling* wouldn't have the same ring.

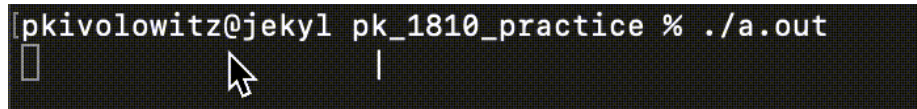


Figure 1: walkies

## Overview

Looking at these characters in sequence:

Order	Character	Comment
0		below delete key - this is called the pipe character
1	/	slash
2	_	underscore
3	\	bash

Notice how the characters can be repeated to approximate a tumbling animation.

You will loop these characters in such a way that they will be drawn marching first to the right across the screen and then back to the left as in the animation above.

The width of the tumbling range will be 60 (the animation above shows a width of 40 but you are to use 60).

The program runs forever... terminate it with ^c (control-c).

## Use of Carriage Return To Cause Redrawing

After emitting a full line of characters, your cursor must be forced back to column 0. You can accomplish this by emitting \r as almost the last thing you print. This is the carriage return... think getting to the end of a line on an old time typewriter.

Kermit must be writing in assembly language because all the lines he's typing are very short.

## Do You Need Any Spaces To The Right Of The Character?

Asking for a friend.



Figure 2: Kermit

## Forcing Output Without New Lines in C++

You're used to this:

```
cout << "Foo" << endl;
```

The `endl` is doing two things for you:

1. Of course, it's giving you a new line but it is also...
2. Triggers the output to actually render on your console

Actual output via streams like `cout` only happens when new lines are emitted. This is called “buffering”. Buffering is a powerful technique to increase efficiency when:

- the amount of output is a little at a time
- output is made frequently
- the cost of emitting the output is high

In C++, to force output that's been buffered up in an output stream, (without requiring a new line), do:

```
cout.flush();
```

or

```
cout << blah << flush;
```

The choice of the method name `flush()` is apropos in that you're “flushing” any buffered characters all the way to their ultimate end point.

Note that `cout` can be replaced with the name of any output stream. Though observe that its counterpart `cerr`, which is intended for diagnostics and error reporting, does not use a buffer so that important messages are reported immediately. As a result, there is never any need to call `cerr.flush()`.

## Forcing Output In Assembly Language

This program can use the low level `write()` which is *not* buffered to emit characters on-demand. `write()` looks like this:

```
ssize_t write(int fd, const void *buf, size_t nbyte);
```

where:

- `ssize_t` means a 64-bit integer.
- `fd` is a file descriptor - a value of 1 means console out.
- `buf` is a pointer to the data to be printed.
- `nbyte` is the number of characters to print.

## Causing A Delay in C++

Since C++ 11, the standard library has provided a portable means of delaying execution of your program, a *pause* in other words. To use this method you need the following includes:

```
#include <chrono>
#include <thread>
```

When it is time to delay, use the following:

```
this_thread::sleep_for(chrono::milliseconds(MILLISECONDS_DELAY));
```

## Causing A Delay in Assembly Language

Once again, we'll use lower level functions. In this case, we'll use `usleep()` where the `u` stands in for `mu`, the Greek letter indicating microseconds, millionths of a second.

`usleep()` looks like this:

```
int usleep(useconds_t microseconds);
```

- `useconds_t` is a synonym for `int`.

## Barbara Woodhouse

Barbara Woodhouse was a pre-Internet phenom world renowned dog trainer. From her, "Walkies!" and "Sit tah!" entered the world's lexicon.

Here she is:



Figure 3: Barbara

## Sample Implementation

A sample implementation can be found [here](#). Try this yourself first before looking at our code.