
16.070 Introduction to Computers and Programming

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Recitation 7

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Topics:

Input / Output

- Formatting Output with *printf*
- File Input / Output

Data Conversion

- Analog vs. Digital
- Analog → Digital
- Digital → Analog

Input / Output

Formatting Output with *printf*

There are several characters that can be added to the format specifiers, %d, %c, %f & %lf, %e, and %s, used in *printf* in order to achieve special formatting in the output. The table below contains the characters that can be added between the % symbol and the character in the format specifier and their resulting format.

Character	Example	Special Formatting
integer	%10d	prints the data in a field that is 10 spaces wide
-	%-10d	prints the data left justified
0	%010d	prints the data with zeros filling the field to the left
+	%+10d	prints positive data with a plus sign
.decimal	%10.3f	prints the data with a field width of 10 with 3 decimal places

If your program uses many *printf* statements and you want all of your data formatted the same way you can make use of variables for determining field width or precision. For example if we define a variable *width* to represent the field width that we want and a variable *precision* to represent the number of decimal places that we want. It is possible to write our output statements as follows:

"w"	write access
"a"	append data to the end of an existing file
"r+"	opens a file for input & output, if it exists already, the contents are not destroyed
"w+"	destroys the file if it exists and creates a new one for update
"a+"	opens a file for update so that writing is done at the end of the file

The "w" and "w+" modes are destructive! The "a" and "a+" modes are not destructive. They append data to already existing files. The difference is that you can read from a file that was opened with "a+" but not one that was opened with "a".

If the *fopen* command fails for some reason the function will return a NULL pointer value. This can be useful when determining whether a file has opened successfully or not. After opening and operating on a file it must be closed. This is done with the *fclose* command:

