Streams

Last updated 6/22/23

These slides introduce streams in C

Streams

- Streams
  - Information flow between entities is done with “streams”
  - Keyboard → Text input stream → program data
    - stdin
  - Program data → Text output stream → Monitor
    - stdout
    - stderr // error messages
  - printf – formats data for the text output stream
  - scanf – formats data from the text input stream

```
#include <stdio.h>
```

Streams

- printf
  - Combines text and data and inserts it into the output stream
  - text and data conversion is contained in double quotes
  - data is comma separated
  - data conversion is identified as %xxx

    % [flag] [min width] [precision] [size] code

```
foo = 12.34567L;            // L indicates a long float
printf("%+6.3LF", foo);
```

%+6.3Lf → +12.345 sign, 6 total, 3 fractional, Long float

Streams

- printf

printf("%d%c%f", 12, 'a', 5.3); → 12a5.300000 no spaces
printf("%d %c %f", 12, 'a', 5.3); → 12 a 5.300000 spaces

int z;
z = 51;
printf("%d %f %c %x", z, z, z, z); → 51 51.00000 3 33
printf(" the value of z is: %d", z); → the value of z is: 51
printf{"I think %d is the value of z", z); → I think 51 is the value of z

Special characters are preceded by \
\n – new line, \t – tab, \% -%, \" – "

printf{"I think \"%d\"is the value of z", z); → I think "51" is the value of z

Streams

- scanf
  - Extracts data from an input stream and formats it
    - lots of options
  - requires a pointer (addresses) for any variables
    - The pointer is required because scanf can read multiple values
  - text and data conversion is contained in double quotes
  - variable pointers are comma separated
  - whitespace is ignored – except for characters
  - data conversion is identified as %xxx

    % [flag] [max width] [size] code

Streams

- scanf

input 123 456 7a

scanf("%d%d%d%c", &a, &b, &c, &d);

a = 123, b=456, c=7, d='a '

xxx%c reads next character

input 123 456 7 a

scanf("%d%d%d%c", &a, &b, &c, &d);

a = 123, b=456, c=7, d=' '

xxx%c reads next character including whitespace

input 123 456 7 a

scanf("%d%d%d %c", &a, &b, &c, &d);

a = 123, b=456, c=7, d='a '

xxx %c ignores any whitespace (not just 1 space) then reads next character

input 14/15 16/17

scanf("%2d/%2d %2d/%2d", &num1, &den1, &num2, &den2);

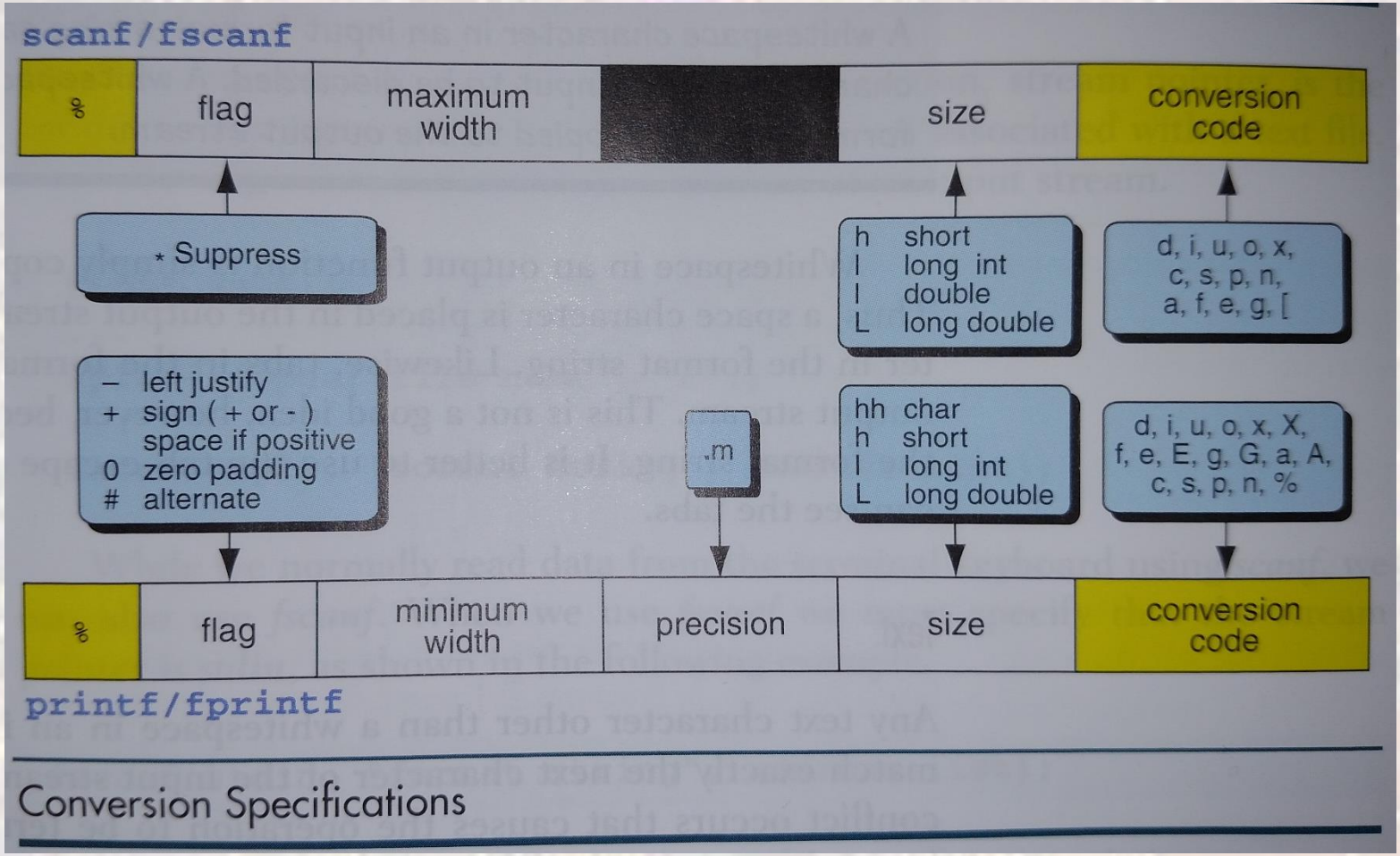
num1 = 14, den1 = 15, num2 = 16, den2 = 17

place characters you don't want to read in the format string

alternate approach: scanf("%2d%c%2d %2d%c%2d", &num1, &trash, &den1, &num2, &trash, &den2);

Streams

- Stream I/O formatting



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Streams

- Stream I/O formatting

Argument Type	Size Specifier	Code
integral	hh (char), h (short), none (int), l (long), ll (long long)	i
integer	h (short), none (int), l (long). ll (long long)	d
unsigned int	hh (char), h (short), none (int), l (long), ll (long long)	u
character octal	hh (unsigned char)	o
integer hexadecimal	h (short), none (int), l (long), ll (long long)	x
real	none (float), l (double), L (long double)	f
real (scientific)	none (float), l (double), L (long double)	e
real (scientific)	none (float), l (double), L (long double)	g
real (hexadecimal)	none (float), l (double), L (long double)	a
character	none (char), l (wchar_t)	c
string	none (char string), l (wchar_t string)	s
pointer		p
integer (for count)	none (int), hh (char), h (short), l (long), ll (long long)	n
set	none (char), l (wchar_t)	[

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