Strings and Arrays

Lecture 4
Jan 19th 2023 | COMP 211-002 | Joshua Bakita

Welcome!

Today:
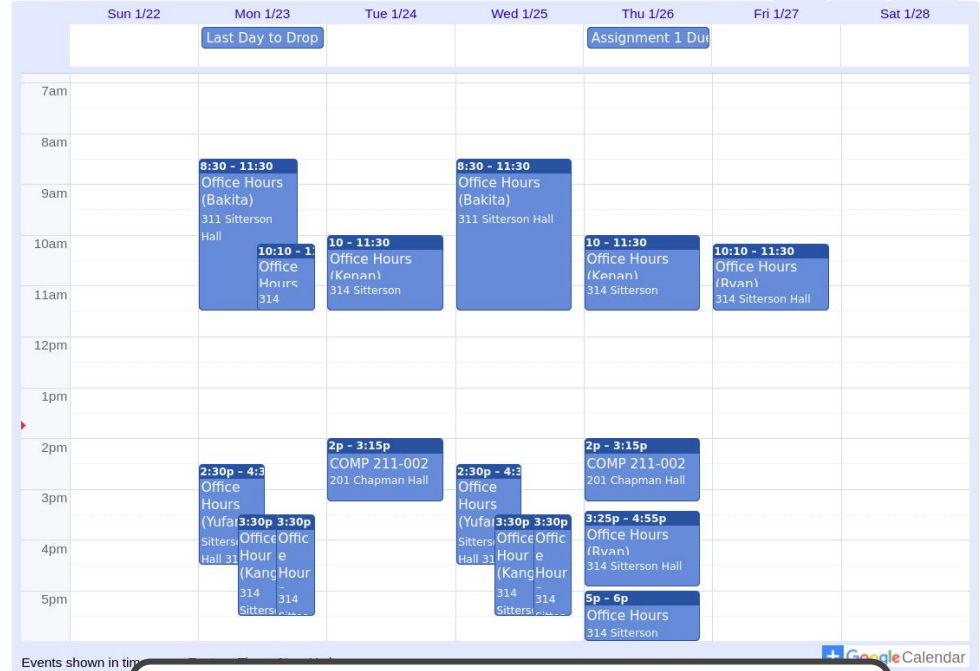➔ Review of `printf()`
➔ Strings, Arrays, and Structures

Logistics:
➔ Readings up, please read them for more detail on in-class material
➔ >50% started on Assign 1. Due in one week.
➔ Prefer Piazza, then email: s23-comp-211-002-staff-cs@cs.unc.edu

Did you know...

Office hour calendar is live on the website

Quick `printf()` Review

Quick `printf()` Review

Last time…

Question From Last Time:
What parameters should I give `printf` to print a number
as hex, like `0x0000BEEF` for decimal number `48879`?

75%-90% of Responses:

```c
#include <stdio.h>

int main() {
    int num = 48879;
    printf("%#08X\n", num);
}
```
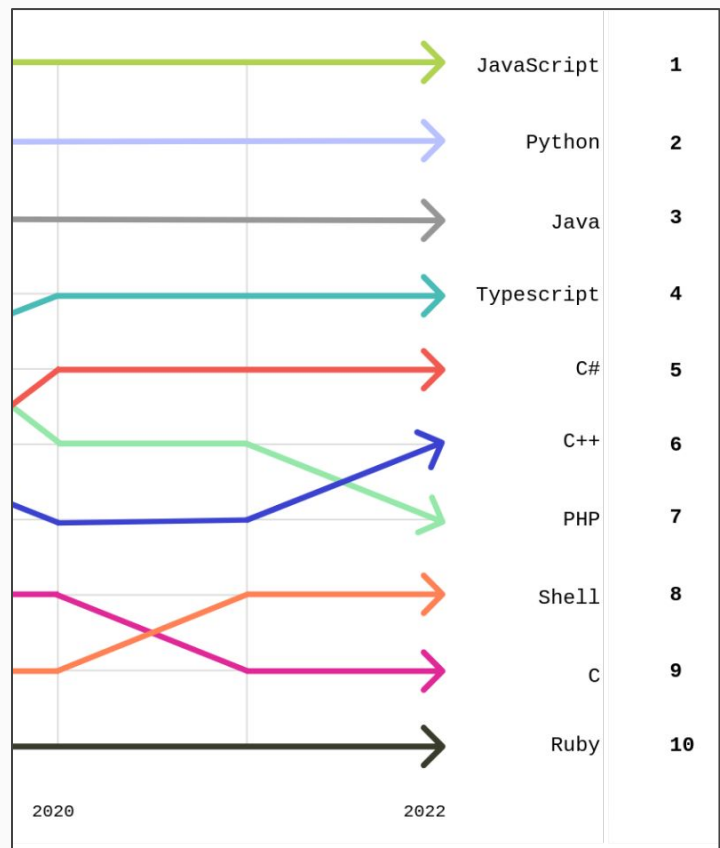
Correct Answer:

```c
#include <stdio.h>

int main() {
    int num = 48879;
    printf("%#010X\n", num);
}
```

Top Programming Languages (GitHub)

Language	Rank
JavaScript	1
Python	2
Java	3
Typescript	4
C#	5
C++	6
PHP	7
Shell	8
C	9
Ruby	10

2020 — 2022

Print PI to 3 decimal places (pi = 3.14159265)

```
console.log("PI is about %.3f", pi);¹
```
```
print("PI is about %.3f"%(pi))
```
```
System.out.printf("PI is about %.3f\n", pi);
```
```
console.log("PI is about %.3f", pi);¹
```
```
printf("PI is about %.3f", __arglist(pi));²
```
```
printf("PI is about %.3f\n", pi);
```
```
printf("PI is about %.3f", $pi);
```
```
printf "PI is about %.3f\n" $pi
```
```
printf("PI is about %.3f\n", pi);
```
```
printf("PI is about %.3f\n", pi)
```

¹ Implements a small subset   ² Requires a special declaration

Quick `printf()` Review

printf() demo

Quick `printf()` Review

Suggested Readings

For `printf()`:
➔ `man 3 printf`
➔ *The GNU C Library Reference Manual,* §12.12–§12.12.6 (9 pgs)
   ◆ `info libc "Formatted Output"`
➔ *The C Programming Language,* §7.2 (2 pgs) or §B1.2 (2 pgs)

Representing Strings

How do we represent strings when we only have integers?

Representing Strings

What is a character?

Read Sec. 1-5 of ANSI Standard X3.4-1977 (linked on website)

b_4 b_3 b_2 b_1	ROW \ COLUMN	0	1	2	3	4	5	6	7
0 0 0 0	0	NUL	DLE	SP	0	@	P	`	p
0 0 0 1	1	SOH	DC1	!	1	A	Q	a	q
0 0 1 0	2	STX	DC2	"	2	B	R	b	r
0 0 1 1	3	ETX	DC3	#	3	C	S	c	s
0 1 0 0	4	EOT	DC4	$	4	D	T	d	t
0 1 0 1	5	ENQ	NAK	%	5	E	U	e	u
0 1 1 0	6	ACK	SYN	&	6	F	V	f	v
0 1 1 1	7	BEL	ETB	'	7	G	W	g	w
1 0 0 0	8	BS	CAN	(	8	H	X	h	x
1 0 0 1	9	HT	EM	)	9	I	Y	i	y
1 0 1 0	10	LF	SUB	*	:	J	Z	j	z
1 0 1 1	11	VT	ESC	+	;	K	[	k	{
1 1 0 0	12	FF	FS	,	<	L	\	l	|
1 1 0 1	13	CR	GS	−	=	M	]	m	}
1 1 1 0	14	SO	RS	.	>	N	^	n	~
1 1 1 1	15	SI	US	/	?	O	__	o	DEL

Page 8, *ANSI Standard X3.4-1977: American National Standard Code for Information Interchange (ASCII)*

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Representing Strings

`"", '', and char *`

Representing Strings

ASCII

Read Sec. 1-5 of ANSI Standard X3.4-1977 (linked on website)

What string does the array of bytes
`{0x55, 0x4e, 0x43, 0x20,`
`0x43, 0x53, 0x20, 0x69,`
`0x73, 0x20, 0x67, 0x72,`
`0x65, 0x61, 0x74, 0x21,`
`0x0a, 0x00}`
represent?

https://PollEv.com/joshuabakita182

b7 b6 b5 →				COLUMN	0 0 0 → 0	0 0 1 → 1	0 1 0 → 2	0 1 1 → 3	1 0 0 → 4	1 0 1 → 5	1 1 0 → 6	1 1 1 → 7
b4	b3	b2	b1	ROW	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	|
1	1	0	1	13	CR	GS	−	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	—	o	DEL

Page 8, *ANSI Standard X3.4-1977: American National Standard Code for Information Interchange (ASCII)*

Suggested Readings

➜ *The GNU C Reference Manual*, §2.5.5 (1 pg)
- ◆ `info gnu-c "Arrays as Strings"`
➜ *ANSI Standard X3.4-1977*, §1 through §5 (5 pgs)
➜ *Computer Systems: A Programmer's Perspective*, §2.1.5 (1 pg)

Thanks!
Questions?

Come chat with me now, or drop by office hours 8:30-11 Monday!

Assignment 1 due Jan 26.

Readings now being posted on the website.

Contact:
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Twitter: @JJBakita
Web: https://cs.unc.edu/~jbakita

Old Well, University of North Carolina at Chapel Hill, Winter 2017