Complex C Types

Lecture 6

Jan 26th 2023 | COMP 211-002 | Joshua Bakita

Welcome!

Today:

- Complex C types
- Debugging

Logistics:

- Assign 2 up by next class.
- 99% started on Assign 1, 77% submitted.
- Prefer Piazza, then email: s23-comp-211-002-staff-cs@cs.unc.edu

Did you know…

```
char fun_message[] = {0x54, 0x72, 0x79,
0x20, 0x72, 0x75, 0x6e, 0x6e, 0x69,
0x6e, 0x67, 0x20, 0x2e, 0x2f, 0x74,
0x65, 0x74, 0x72, 0x69, 0x73, 0x20,
0x6f, 0x6e, 0x20, 0x74, 0x68, 0x65,
0x20, 0x73, 0x65, 0x72, 0x76, 0x65,
0x72, 0x00};
```

It seems like very few of you got through this last time, so here it is again.
See the slides from lecture 4 for the ASCII table.

Complex C Types

Let's use them to control the NVIDIA GPU scheduler…

Complex C Types: Enum

nvdebug.h, enum ENTRY_TYPE

Code available at
https://www.cs.unc.edu/~jbakita/teach/comp211-s23/l6/nvdebug.h

Complex C Types: Bit-packed Struct

nvdebug.h, struct gv100_runlist_tsg

Code available at
https://www.cs.unc.edu/~jbakita/teach/comp211-s23/l6/nvdebug.h

Complex C Types: Union

`nvdebug.h, runlist_base_t`

Code available at
https://www.cs.unc.edu/~jbakita/teach/comp211-s23/l6/nvdebug.h

Complex C Types: Everything All at Once!

`nvdebug.h, runlist_info_t`

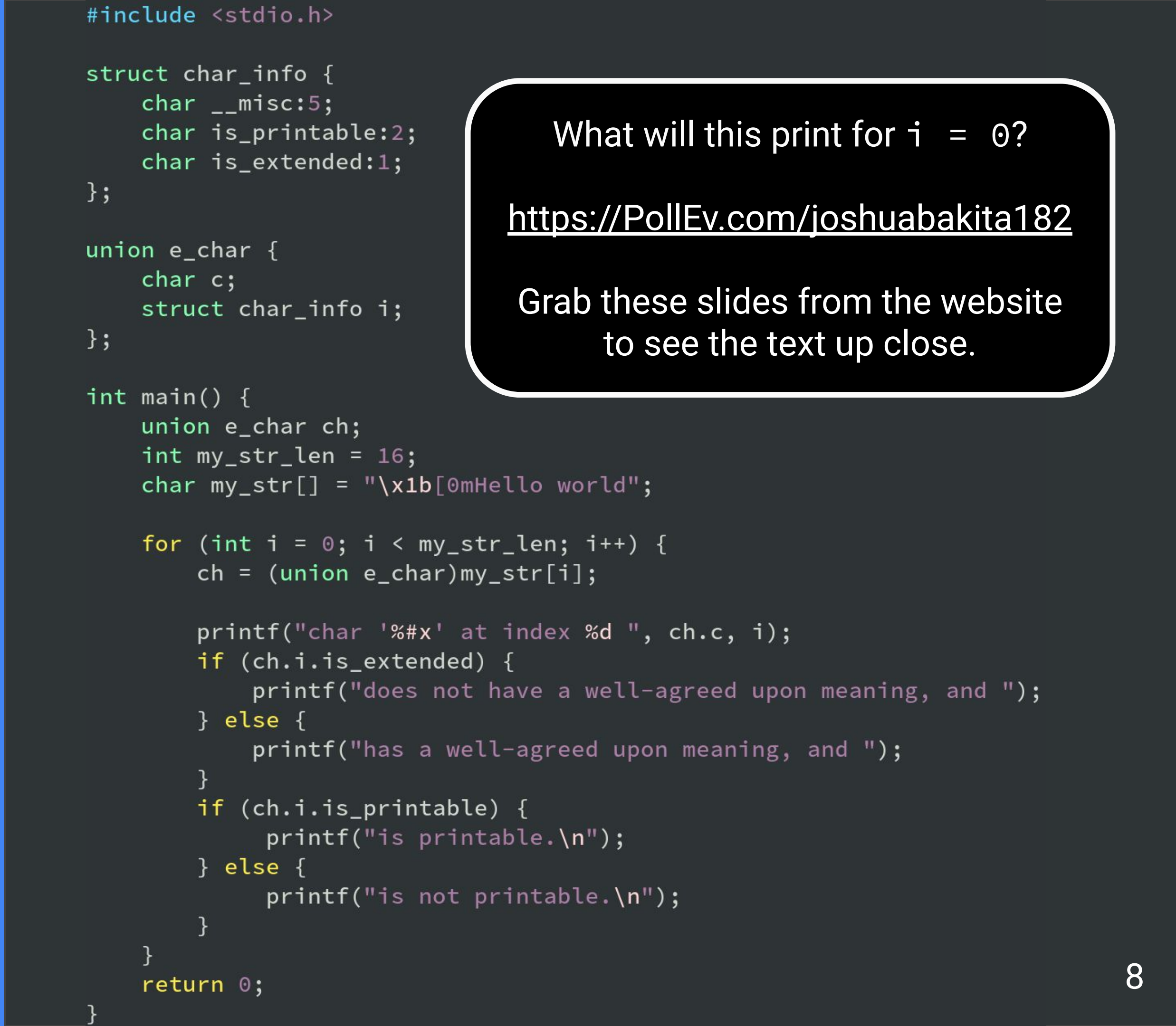
Code available at
https://www.cs.unc.edu/~jbakita/teach/comp211-s23/l6/nvdebug.h

Complex C Types

Your turn!

Try it yourself!

```
$ wget https://www.cs.unc.edu/~jbakita/teach/comp211-s23/l6/mystery2.c
$ gcc mystery2.c -o myst
$ ./myst
```



```
#include <stdio.h>

struct char_info {
    char __misc:5;
    char is_printable:2;
    char is_extended:1;
};

union e_char {
    char c;
    struct char_info i;
};

int main() {
    union e_char ch;
    int my_str_len = 16;
    char my_str[] = "\x1b[0mHello world";

    for (int i = 0; i < my_str_len; i++) {
        ch = (union e_char)my_str[i];

        printf("char '%#x' at index %d ", ch.c, i);
        if (ch.i.is_extended) {
            printf("does not have a well-agreed upon meaning, and ");
        } else {
            printf("has a well-agreed upon meaning, and ");
        }
        if (ch.i.is_printable) {
             printf("is printable.\n");
        } else {
             printf("is not printable.\n");
        }
    }
    return 0;
}
```

What will this print for `i = 0`?

https://PollEv.com/joshuabakita182

Grab these slides from the website to see the text up close.

Recommended Readings

Structs:

- ➔ See readings from last time.

Unions:

- ➔ *The GNU C Reference Manual*, §2.3 (3 pgs)
  - ◆ `info gnu-c "Unions"`
- ➔ *The C Programming Language*, §6.8 (2 pgs)

Enumerations:

- ➔ *The GNU C Reference Manual*, §2.2 (1 pg)
  - ◆ `info gnu-c "Enumerations"`
- ➔ *The C Programming Language*, §2.3 (3 pgs)

Thanks!
Questions?

See office hour calendar on the website for availability.

Assignment 1 due tonight!

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