CS 214: System Programming
(Sec 02 10:35 AM - 11:30 AM ARC-105)

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09/28/2017
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What will we do in this recitation?

- Tips About Project Sorting

- Review class materials

- Introduction about GDB

- Homework & Practicing

Some special input:

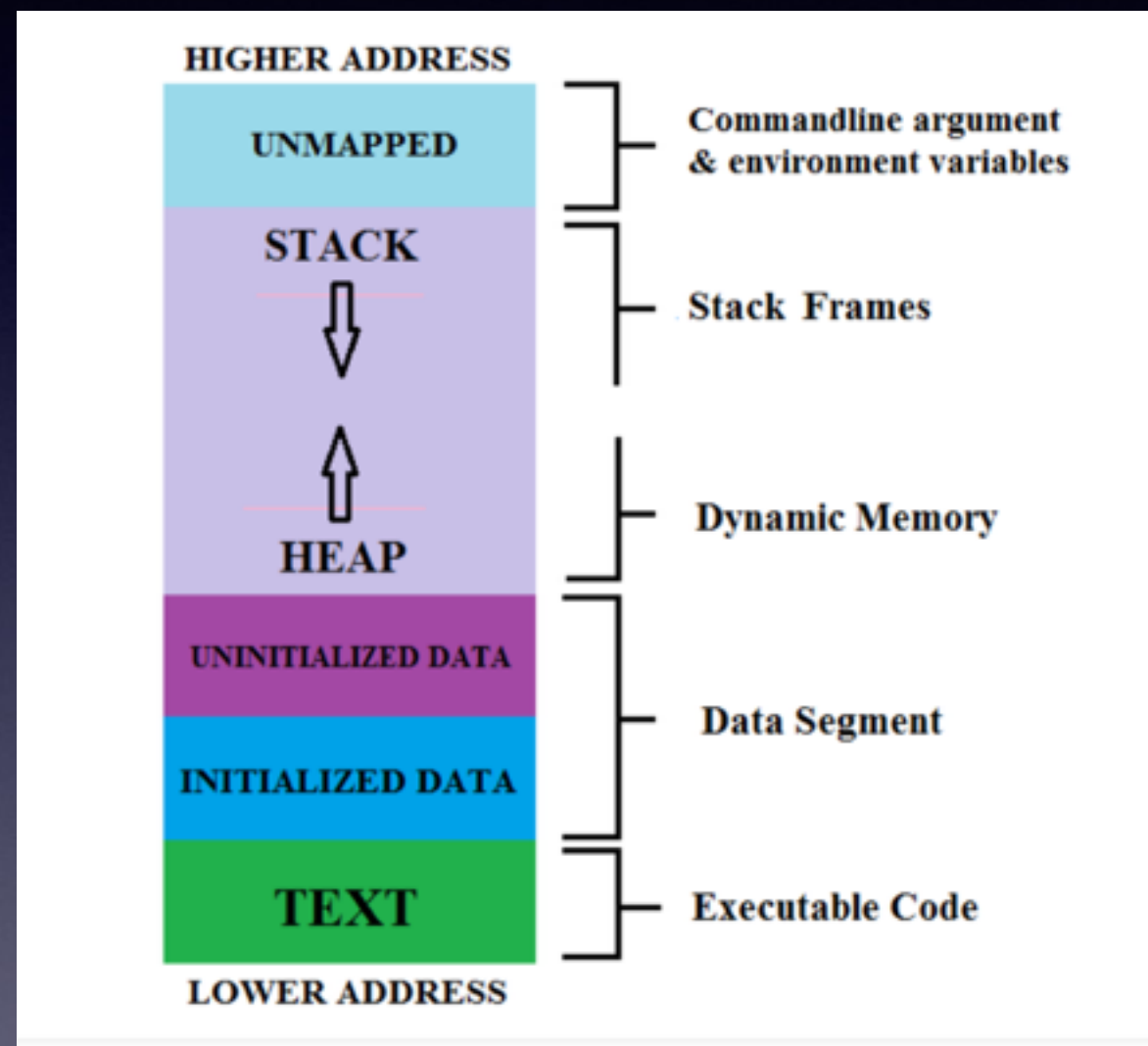…,8,143,,0,,http://www.imdb.com/title/tt5289954/?
ref_=fn_tt_tt_1,,,,,,,12,7.1,,0

…,Thomas Brophy,252,,Horror|Thriller,Julianne
Gabert,"Run, Hide, Die ",106,638,Ronee

small scale data set, line break

dynamic/static memory allocation
Pointers/arrays/const malloc/free
pointer arithmetic
structs sizeof
string library

C Memory Layout

C Memory Layout

check the memory layout by gcc command:
$gcc memory-layout.c -o memory-layout

text	data	bss	dec	hex filename
1749	584	8	2341	925 memlayout

machine code   initialised   uninitialised

dec = text + data + bss

C Memory Layout

Memory leak

↓   no available memory resource

Out of Memory

Stack overflow

↓   access permitted memory space

Segmentation fault

GDB Introduction

https://www.gnu.org/software/gdb/

debug: printf(log) vs gdb?

break points
watch the variable
step into a function

Demo

- `l` list source code
- `file` load target binary file
- `info` list relevant info about target code
- `b <line number>` set the break point
- `p <variable number>` print the variable
- `n` next line next line (step over)
- `s` step into the function
- `c` continue continue execution
- `d <line number>` delete the breakpoints
- `info`

HW1 - answer review

Write your own version of atoi

8. String to Integer (atoi)

| 📋 Description | 💡 Hints | 📄 Submissions | 💬 Discuss | ⚖ Solution |

| 💬 Discuss | | ⇄ Pick One |

Implement atoi to convert a string to an integer.

| 8 | String to Integer (atoi) | 13.9% | Medium |

Submission Result: Wrong Answer → Submission Result: Accepted ❓

```
printf("%d\n",myAtoi(NULL));
printf("%d\n",myAtoi("-1"));
printf("%d\n",myAtoi("01"));
printf("%d\n",myAtoi("010"));
printf("%d\n",myAtoi("0003"));
printf("%d\n",myAtoi("512"));
printf("%d\n",myAtoi("-003"));
printf("%d\n",myAtoi("abcd"));
printf("%d\n",myAtoi("a123"));
printf("%d\n",myAtoi("    a123"));
printf("%d\n",myAtoi("    -a123"));
printf("%d\n",myAtoi("    2147483649999"));
printf("%d\n",myAtoi("+-2"));
printf("%d\n",myAtoi("9223372036854775809"));
```

Test driven programming
All possibilities

HW2

0. Consider:

```
int i = 5;
int *ip = &i;
```

.. what is ip? What is its value?

HW2

1. Write some code that declares two arrays of size 10 that are string literals.

Make a pointer to one of the arrays, cast it to be an int pointer, and print out its value.

Make a new integer, set it equal to the value of your int pointer, then make a pointer to that integer, cast it to be a char pointer, and print out 8 chars.

What happened? Why?

HW2

2. Write some code that declares two arrays of size 10 that are string literals.

     Create a pointer that points to the beginning of the first array, then in a loop, increment the pointer and print out the char it points to, out to index 20.

                        What happened? Why?