

APS 105

Winter 2012

Jonathan Deber

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Lecture 3
January 20, 2012

Today

- MarkUs Demo
- Dealing with errors
- Variables

- CodeLab due Sunday
- A0 “due” Saturday

Welcome to MarkUs!



APS105, winter 2012

Login

Password

Log in

MarkUs - index

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https://stanley.cdf.toronto.edu/markus/aps105-2012-01/en/main/assignments

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MarkUs

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Choose...

Your Assignments

| Name | Due Date | Results |
|----------------------------------|--------------------------------------|---------|
| Ao: Assignment 0 | Due dates are specified per section. | |

Your Term Marks

There are currently no marks spreadsheets.

MarkUs - student_interface

https://stanley.cdf.toronto.edu/markus/aps105-2012-01/en/main/assignments/student_interfac


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Results

Assignment A0

Submissions

Overview

Last Revision Date:
January 17, 2012: 04:45pm

0 files

1 missing required files

Group Information

Your group

- Jonathan Deber (inviter)

Group Properties

- You can invite only students of your section
- Students work alone
- Your group has 0 available grace credits

Assignment Rules

Name: A0

Description: Assignment 0

Message:
A warm-up assignment.

Due Date: January 21, 2012: 11:59pm

Files required for this assignment

- message.c

MarkUs - file_manager


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A0: File Manager

Server Time: January 17, 2012: 04:48pm



You still need to submit 1 required file(s) for this assignment:

- message.c

Add new

Submit

Cancel

| Filename | Last Revised | Revised By | Replace | Delete |
|----------|--------------|------------|---------|--------|
| Filename | Last Revised | Revised By | Replace | Delete |

Submit

Cancel

MarkUs - file_manager


https://stanley.cdf.toronto.edu/markus/aps105-2012-01/en/main/submissions/file_manager/1

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A0: File Manager

Server Time: January 19, 2012: 04:49pm

You still need to submit 1 required file(s) for this assignment:

- message.c

Add new

Submit

Cancel

| Filename | Last Revised | Revised By | Replace | Delete |
|--|--------------|------------|---------|--------------------------|
| <div><div>Choose File</div><div>No file selected</div></div> | | | | <input type="checkbox"/> |

Submit

Cancel

MarkUs - file_manager


https://stanley.cdf.toronto.edu/markus/aps105-2012-01/en/main/submissions/file_manager/1

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MarkUs - file_manager

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A0

A0: File Manager

Server Time: January 19, 2012: 04:49

You still need to submit 1 required file

- message.c

Add new


Submit

Cancel

| Filename | Last Revised | Revised By | Replace | Delete |
|--|--------------|------------|---------|--------------------------|
| <div><div>Choose File</div><div>No file selected</div></div> | | | | <input type="checkbox"/> |

Submit

Cancel

**https://stanley.cdf.toronto.edu**

After you submit the filename will change from 'C:\fakepath\message.c' to 'C__fakepath_message.c'. Is that OK?

Cancel

OK

MarkUs - file_manager

https://stanley.cdf.toronto.edu/markus/aps105-2012-01/en/main/submissions/file_manager/1

Google

MarkUs - file_manager

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A0: File Manager

Server Time: January 17, 2012: 04:49pm

You still need to submit 1 required file(s) for this assignment:

- message.c

Add new

Submit

Cancel

| Filename | Last Revised | Revised By | Replace | Delete |
|--|--------------|------------|---------|--------------------------|
| <div><div>Choose File</div><div> message.c</div></div> | | | | <input type="checkbox"/> |

Submit

Cancel

MarkUs - update_files


https://stanley.cdf.toronto.edu/markus/aps105-2012-01/en/main/submissions/update_files/1

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MarkUs - update_files

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Choose Language: enJonathan Deber (deberjon) Log out



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A0: File Manager


Server Time: January 17, 2012: 04:51pm

✔ Your changes have been made.

Add new

Submit

Cancel

| Filename | Last Revised | Revised By | Replace | Delete |
|--|---------------------------|------------|---|--------------------------|
|  message.c | January 17, 2012: 04:51pm | deberjon | <div><div>Choose File</div>no file selected</div> <div>Cancel</div> | <input type="checkbox"/> |

Submit

Cancel

MarkUs – student_interface

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https://stanley.cdf.toronto.edu/markus/aps105-2012-01/en/main/assignments/student_interfac

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MarkUs – student_interface

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Assignment A0

Submissions

Overview

Last Revision Date:
January 17, 2012: 04:51pm

1 files

0 missing required files

Assignment Rules

Name: A0

Description: Assignment 0

Message:
A warm-up assignment.

Due Date: January 21, 2012: 11:59pm

Files required for this assignment

- message.c

Group Information

Your group

✔ Your changes have been made.

- Jonathan Deber (inviter)

Group Properties

- You can invite only students of your section
- Students work alone
- Your group has 0 available grace credits

Running a Program

- Program in .c file (plain text)
- `$ gcc -o hello hello.c`
- `$./hello`
- No message if no errors

Warning!

```
$ gcc -o hello.c hello.c
```

The Programming Cycle

- (A) Edit your code
- (B) Compile it
- (C) If there are errors, go back to (A) to fix them
- (D) Run it and test it
- (E) Find bugs, go back to (A) to fix them

Elements of Programs

- Defining variables
- Operating on variables
- Controlling the program's flow
- Defining and using functions

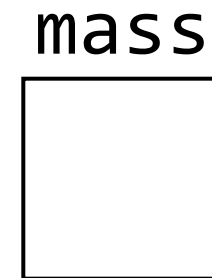
Variables

- Place to store data in memory
- Create them with a *declaration*

- `int mass;`

↑
type

↑
name (identifier)



Assignment

```
int mass;  
mass = 42;
```

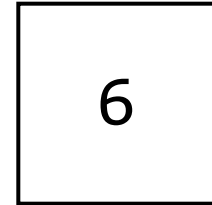
mass

42

Retrieving Values

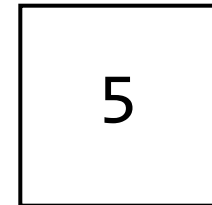
```
int mass;  
mass = 5;
```

mass



```
int weight;  
weight = mass;
```

weight



```
mass = 6;
```

When `=` does not equal `=`

$$\sin(\pi) = 0$$

$$\sin(\pi) = 1$$

Wrong

$$\text{mass} = 6;$$

$$\text{mass} = 8;$$

Expressions

- Something that produces a value

| lvalue | rvalue |
|---------------------|----------------------|
| <code>mass</code> | <code>= 42;</code> |
| <code>weight</code> | <code>= mass;</code> |

| | |
|-------------------------|-------|
| <code>42 = mass;</code> | Error |
|-------------------------|-------|

| | |
|-------------------|--------------------------|
| <code>mass</code> | <code>= 42 + 2;</code> |
| <code>mass</code> | <code>= 6 * 7;</code> |
| <code>mass</code> | <code>= mass + 6;</code> |

$$\sin(\pi) = 0$$
$$0 = \sin(\pi)$$

$$x = x + 6$$

$$x - x = 6$$

$$0 = 6$$

Identifier Naming Rules

- Alphanumeric plus _ `abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789_`
- Can't start with a digit
- Case sensitive (e.g., `mass` vs. `Mass` vs. `MASS`)
- Can't use reserved keywords (e.g., `int`, `return`)
- Conventions:
 - `camelCase` (or `separated_with_underscores`)
 - Begin with lower case
 - All caps for constants (e.g., `MAXLINES`)

Declarations

```
int position, height;
```

```
int position;  
int height;
```

```
int score = 20;
```

```
int score;  
score = 20;
```

```
int length = 3, width, depth = 7;
```

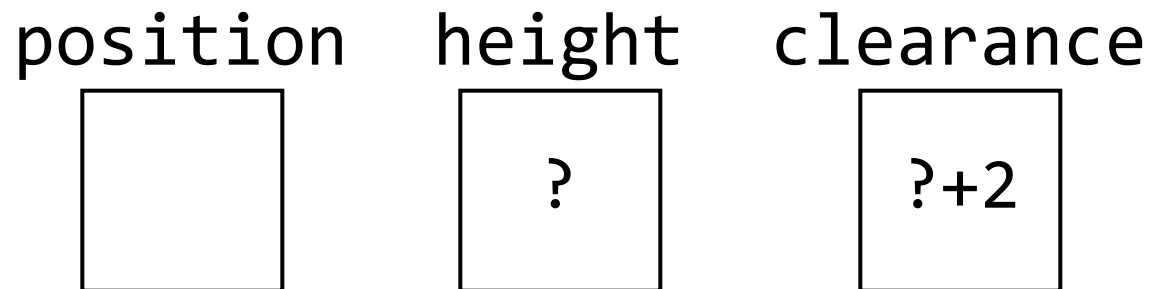
Bad Style

```
int length = 3;  
int width;  
int depth = 7;
```

Declarations

```
int position, height;  
int clearance = height + 2;
```

Wrong



Types

- “The pen is 65 away from the laptop”
- Need a unit to interpret the 65
- Types give us that unit
- Allow compiler to do some error checking

int

- Holds non-fractional numbers
- An `int` is not entirely equivalent to an integer
- Guaranteed: -32,767 to 32,767 (2 bytes)
- ECF: -2,147,483,648 to 2,147,483,647 (4 bytes)
- Friends: `short`, `long`, `long long`

Warning:
`int i = 031;`
`int j = 31;`

double

- Holds fractional numbers (e.g., 4.3×10^4)
- A double is not a real number
- Guaranteed:
 - Exponent: 10^{-37} to 10^{37}
 - Accuracy: 10 digits
- ECF (8 bytes):
 - Exponent: 10^{-1022} to 10^{1023}
 - Accuracy: 53 digits
- Friend: float

How to Write a double

- Anything with a decimal point
 - 29.0
 - 24.9
 - 289. Bad Style
- Scientific notation
 - $2.8E4 \rightarrow (2.8 \times 10^4) \rightarrow (2.8 \times 10000) \rightarrow 28,000$

Literals

- An expression with a fixed value
- `int size = 12;`
- `double volume = 355.0;`

Printing Output

printf

- Prints “formatted” output
- `printf("This is a string");`
- Outputs characters as-is with two exceptions:
 - Escape sequence (string-related)
 - Format specifiers (printf-related)

Escape Sequences

- If character is `\`, the next character is special

- `\"`

He said "sure".

Error

- `\\` `printf("He said \"sure\".");`
- `\n` `printf("He said \"sure\\\".");`

- etc. (see Appendix A)
- It's still one character

\n

- printf resumes from where it left off

```
printf("This is line 1");  
printf("This is line 2");
```

This is line 1This is line 2

```
printf("This is line 1\n");  
printf("This is line 2\n");
```

This is line 1↵
This is line 2↵

Format Specifiers

- If character is %, the next (few) characters are special
- `printf` will use them to interpret extra variables

```
int number = 42;
```

```
printf("This is a number: %d\n", number);
```

```
This is a number: 42
```

Format Specifiers

- Lots of them, with many options
- `int`
 - `%d`
- `double`
 - `%g` (general purpose)

| | |
|--|-------------|
| <code>printf("%g\n", 1.5);</code> | 1.5 |
| <code>printf("%g\n", 299792458.0);</code> | 2.99792e+08 |
| <code>printf("%g\n", 3.141592653589);</code> | 3.14159 |

Demo

Caution

- Format string *must* match variables
- If not, it's unpredictable (“undefined behaviour”)
 - Best case: immediate crash, obvious garbage
 - Worst case: works for now, subtle garbage, later crash

Compiler Warnings

- Additional compiler diagnostics
- `$ gcc -Wall -o height2 height2.c`
- My suggestion
 - Always use them
 - Don't ignore them