CS50 Supersection

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Announcements

- Office hours
- CS50 Appliance
- Have you started your problem set yet?

Today's agenda

1. CS50 Appliance
2. Command line
3. Compiling
4. CS50 Style Guide
5. Variables and math in C
6. Logic in C
7. Loops

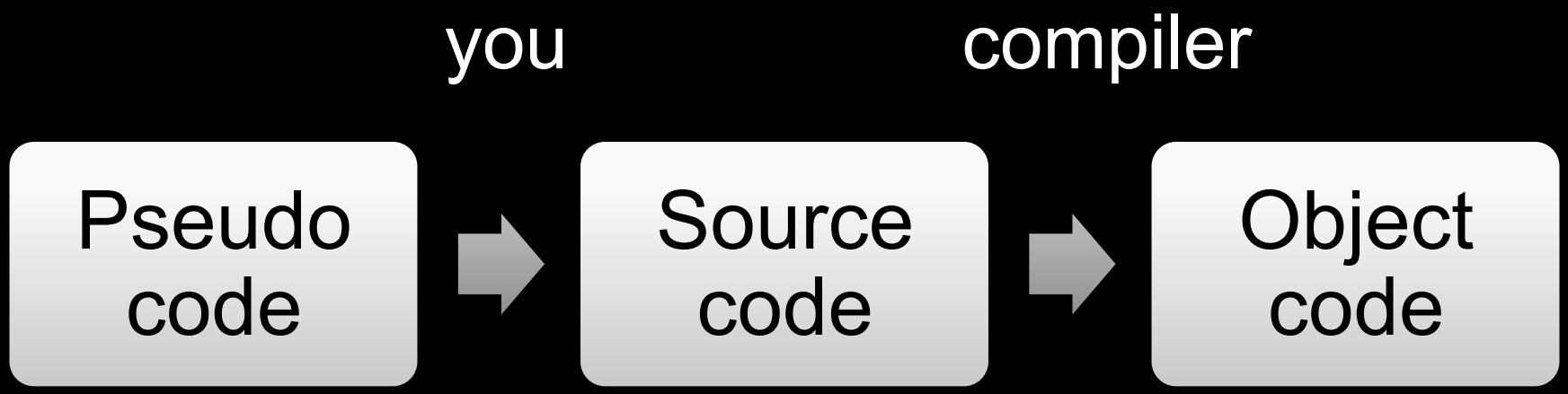
CS50 Appliance

- Instructions at http://cs50.net/appliance
- gedit
- Terminal

Command line

- `ls`
- `mkdir`
- `cd`
- `rm`
- `rmdir`
- you will learn more as the semester goes

Compiling



Compiling

- Example: writing a program that says “hello”

Compiling

- Pseudo code:

1. start program
2. print hello
3. quit

Compiling

- Source code in C:

```
#include <stdio.h>

int main(void)
{
    printf("hello\n");
}
```

Compiling

- Object code:

```
11001111 11111010 11101101 11111110
00000111 00000000 00000000 00000001
00000011 00000000 00000000 00000000
00000001 00000000 00000000 00000000
00000011 00000000 00000000 00000000
10110000 00000101 00000000 00000000
00000000 00100000 00000000 00000000
00000000 00000000 00000000 00000000
00011001 00000000 00000000 00000000
01001000 00000101 00000000 00000000
00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000
```

Compiling

- Compiling a program:

```
make hello
clang -o hello hello.c
```

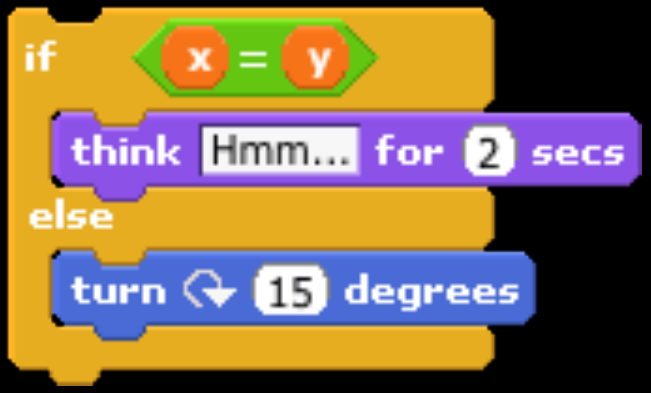
- Running a program:

```
./hello
```

CS50 Style Guide

- Part of your style score
- Guidelines to make sure your code is readable
- Let’s take a look at some of them!

Conditions and Boolean Expressions



If statement

```c
#include <cs50.h>
#include <stdio.h>

int main(void)
{
    printf("Give me an integer: ");
    int n = GetInt();

    if (n > 0)
    {
        printf("You picked a positive number!\n");
    }
}
```

Boolean Expressions

<
<=
>
>=
==
!=
!

Evaluates to either true or false.

Combining Boolean Expressions

Logical OR: ||

```
if (x < 0 || x > 100)
{
    printf("invalid\n");
}
```

Logical AND: &&

```
if (x >= 0 && x <= 100)
{
    printf("valid\n");
}
```

```c
#include <cs50.h>
#include <stdio.h>

int main(void)
{
    printf("Give me an integer: ");
    int n = GetInt();

    if (n > 0)
    {
        printf("You picked a positive number!\n");
    }
    else
    {
        printf("You picked a negative number!\n");
    }
}
```

```c
if (n > 0)
{
    printf("You picked a positive number!\n");
}
else if (n < 0)
{
    printf("You picked a negative number!\n");
}
else
{
    printf("You picked 0!\n");
}
```

```c
#include <cs50.h>
#include <stdio.h>

int main(void)
{
    printf("Enter your grade: ");
    int n = GetInt();

    if (n > 90)
    {
        printf("You got an A!\n");
    }
    if (n > 80)
    {
        printf("You got a B!\n");
    }
}
```

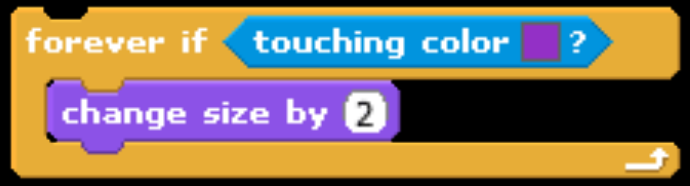
```c
int main(void)
{
    printf("Give me an integer between 1 and 3: ");
    int n = GetInt();

    switch (n)
    {
        case 1:
            printf("You picked a low number.\n");
            break;
        case 2:
            printf("You picked a medium number.\n");
            break;
        case 3:
            printf("You picked a high number.\n");
            break;
        default:
            printf("Invalid.\n");
            break;
    }
}
```

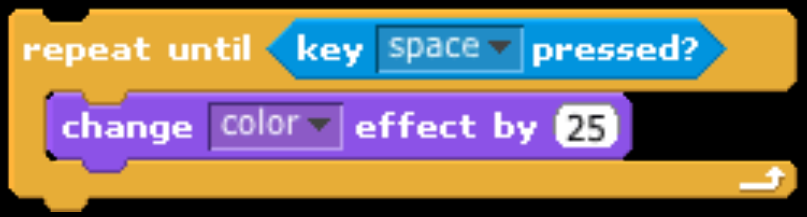
Ternary Operator

```c
#include <cs50.h>
#include <stdio.h>

int main(void)
{
    printf("Give me an integer: ");
    int n = GetInt();

    string s = (n > 100) ? "high" : "low";

    printf("You picked a %s number!\n", s);
}
```

Loops


repeat 5
play sound meow

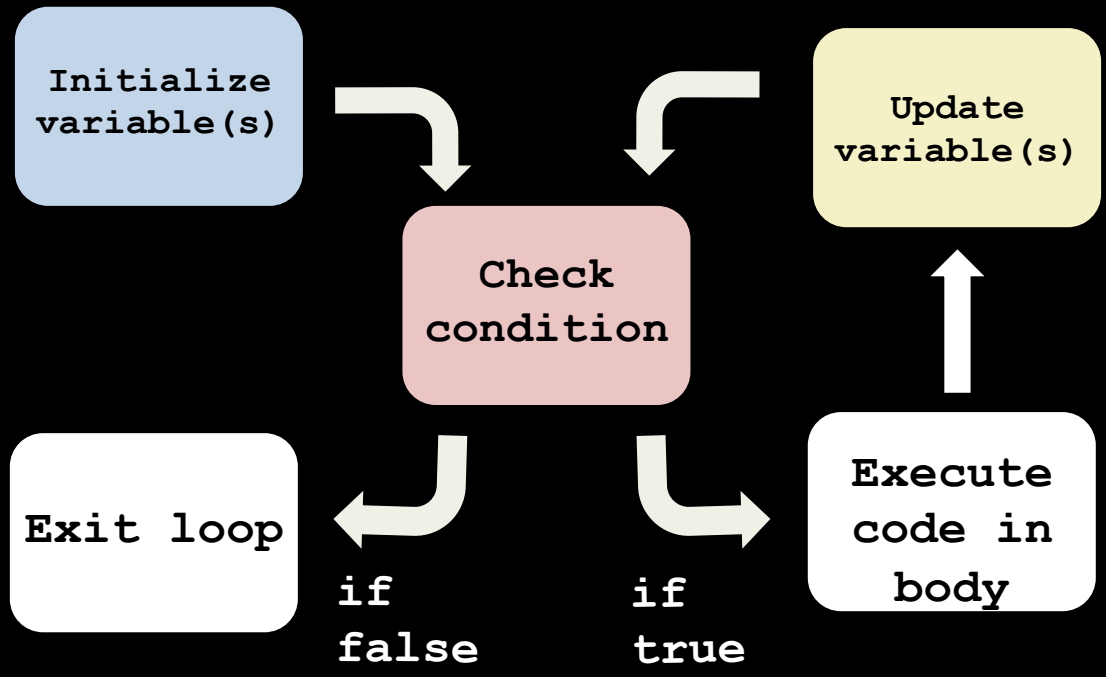

forever if touching color ?
change size by 2


repeat until key space pressed?
change color effect by 25


forever
move 10 steps
if on edge, bounce

For Loops

```
for (initialization; condition; update)
{
    execute this code
}
```

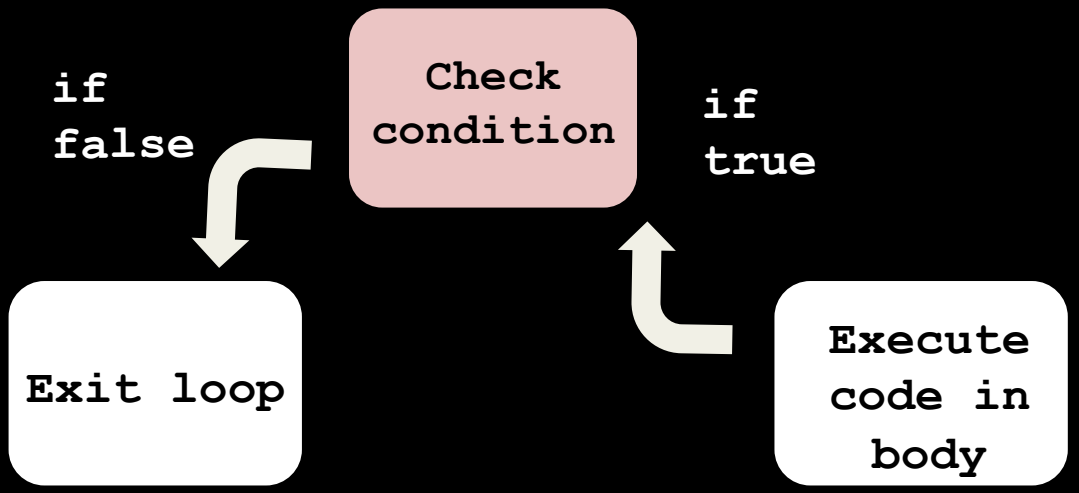


Example
Prints “This is CS50!” ten times


```
for (int i = 0; i < 10; i++)
{
    printf("This is CS50!\n");
}
```

While Loops

```
while (condition)
{
    execute this code
}
```

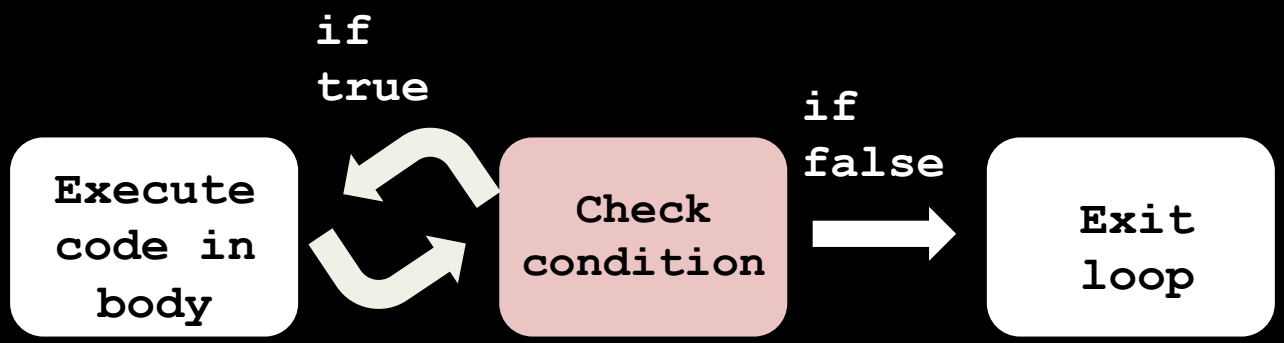


Example
Counts down from 10 to 0


```
int count = 10;
while (count >= 0)
{
    printf("%i\n", count);
    count--;
}
```

Do While Loops

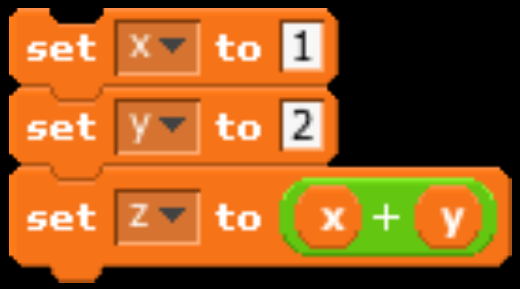
```
do
{
    execute this code
}
while (condition);
```



Example
Reprompts until user enters a positive number

```
int input;
do
{
    printf("Enter a positive number: ");
    input = GetInt();
}
while (input < 1);
```

Math in C



Numerical Variables

```
int
float
double
long long
```

Let's add some ints!

```
// declare x
int x;

// initialize x
x = 2;

// declare and initialize y
int y = x + 1;
```

Division

```c
int main(void)
{
    // declare and initialize answer
    float answer = 1 / 10;

    // print answer to two decimal places
    printf("%.2f\n", answer);
}
```

Fixed version: Typecasting

```c
int main(void)
{
    // declare and initialize answer
    float answer = (float) 1 / (float) 10;

    // print answer to two decimal places
    printf("%.2f\n", answer);
}
```

Another way

```c
int main(void)
{
    // declare and initialize answer
    float answer = 1.0 / 10.0;

    // print answer to two decimal places
    printf("%.2f\n", answer);
}
```

Operator Precedence

What is x?

1. `int x = 2 * 10 + 10 / 2 + 2;`
2. `int x = 2 * (10 + 10) / 2 + 2;`
3. `int x =  2 * (10 + 10) / (2 + 2);`

Modulo

1. `55 % 10`
2. `3 % 5`
3. `8 % 8`
4. `16 % 15`

What will print?

```c
int main(void)
{
    // declare and initialize x, y, z
    int x = 1;
    int y = 2;
    int z = (x + y) * y % y + y;

    // print z
    printf("%i\n", z);
}
```

Floating Point Imprecision

```c
int main(void)
{
    // initialize x and y
    float answer = 1.0 / 10.0;

    // print answer to two decimal places
    printf("%.20f\n", answer);
}
```