TIC1001—Introduction to Computing and Programming
National University of Singapore

Lecture 5: Compilation & Data

Revisit Instruction Set Architecture (ISA)

Which of the following software requires knowledge of ISA to function?
Note: Compiler here refers only to the compiler subcomponent, not the entire compiler suite.

Compiler
Assembler

What kind of error?

What type of error do you get for this program?

In [ ]:
```c
#include <stdio.h>

int main()
{
    int answer, x = 3;
    printf("Answer is %d\n", x + y );

    return 0;
}
```

Syntax Error

What kind of error II?

What type of error will you encounter for the following program?

In [ ]:
```c
#include <stdio.h>
int main()
{
    printf("SquareRoot(3.14159) = %5.2f\n", squareroot(3.14159));
    return 0;
}
```

Linking Error

What kind of error III?

What kind of error will you encounter for the following program?

In [ ]:
```c
#include <stdio.h>

int main()
{
    int x = 7;

    if ( 10 > x > 1){
        printf("x is between 1 and 10\n");
    } else {
        printf("x is not between 1 and 10\n");
    }

    return 0;
}
```

Logic Error

What kind of error IV?

What kind of error will you encounter for the following program?

In [ ]:
```c
#include <stdio.h>

int main()
{
    int i, x = 123;

    for (i = 10; i >= 0; i--){
        printf("Remainder of (%d / %d) is %d\n", x, i, x % i);
    }
    return 0;
}
```

Runtime Error

Small Integer

What is the range of non-negative integer value you can store in a byte?

[0 to 255]

What is the value?

What is the binary equivalent for 0xCAFE?

1100 1010 1111 1110

Can you do this?!

What is the output of the following C program?

In [ ]:
```c
#include <stdio.h>

int main()
{
    printf("Answer is %d\n", 0x20 + 10);

    return 0;
}
```

Answer is 42

What color is this?

Mr.Lsh receive a mysterious color value encoded in RGB format from his friend. When he print out the RGB value as an integer, he saw a surprisingly big number:
1193046
Can you help him to find out the actual R, G and B value?

1193046 % 256 = 86
1193046 / 256 % 256 = 52.33
1193046 / 256 / 256 % 256 = 18.2

R = 18, G = 52, B = 86

High definition!

Each pixel (each "dot" of color) on your HD TV can be represented by a 32-bit RGB value (i.e. 4 bytes == 1 pixel).
At any point in time, there are 1920 "columns" and 1080 "rows" of pixels on a HD TV screen.
For smooth viewing experience, we need to show 24 screens (known as frame) per second.
What is the data bandwidth (i.e. how many bytes per second) needed by the HD TV? Choose the closest estimation.

~ 100MBytes (1M = 10^6) / Second

-END-