CS 2263 - FR02B
Lab 1

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Ice Breaker:

Answer:

► Ben Jacobs:
   o Likes mint chip ice-cream flavor
   o would like to complete one of the random projects he has started before January

► Michael Bridgland:
   o Likes anything with cheesecake basically
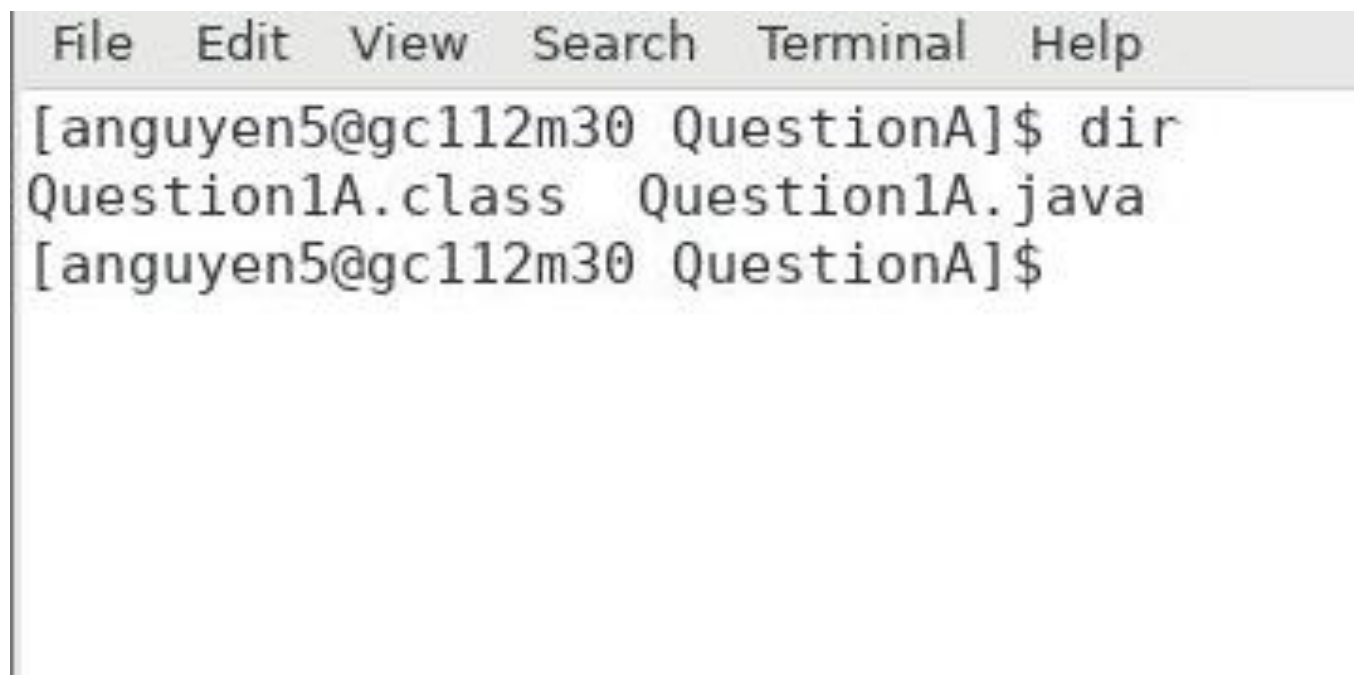   o Would like to see his daughter on Hallowe'en

Java and C:

Question A: Implement the HelloWorld program in Java (i.e. a Java program that prints the string: Hello World). Compile and run the HelloWorld program:

```
Question1A.java                          Question1B.c

public class Question1A
{
  public static void main(String[] args)
  {
    System.out.println("Hello World");
  }
}
```

Figure 1: Source Code of Question A

```
File   Edit   View   Search   Terminal   Help
[anguyen5@gc112m30 QuestionA]$ dir
Question1A.class   Question1A.java
[anguyen5@gc112m30 QuestionA]$
```

Figure 2: Files of Question A

```
extern int ftrylockfile (FILE *__stream) __attribute__ ((__nothrow__ , __leaf__)
) ;

extern void funlockfile (FILE *__stream) __attribute__ ((__nothrow__ , __leaf__)
);
# 943 "/usr/include/stdio.h" 3 4

# 2 "Question1B.c" 2
int main()
{
  printf("Hello World");
  return 1;
}
[anguyen5@gc112m30 Lab 1]$ gcc -c Question1B.c
[anguyen5@gc112m30 Lab 1]$ gcc -o Question1B Question1B.c
[anguyen5@gc112m30 Lab 1]$ ./Question1B
Hello World[anguyen5@gc112mcd "Lab 1"
Lab 1: No such file or directory.
[anguyen5@gc112m30 Lab 1]$ cd QuestionA
[anguyen5@gc112m30 QuestionA]$ javac Question1A.java
[anguyen5@gc112m30 QuestionA]$ java Question1A
Hello World
```

Figure 3: Output of Question A

Question B: Implement the HelloWorld program in C as `helloworld.c` (i.e. a C program that prints the string: Hello World). Compile and run the HelloWorld program.

```
#include <stdio.h>
int main()
{
  printf("Hello World");
  return 1;
}
```

Figure 4: Source Code of Question B

```
[anguyen5@gc112m30 QuestionB]$ dir
helloworld  helloworld.c  helloworld.o
[anguyen5@gc112m30 QuestionB]$
```

Figure 5: Files of Question B

```
extern char *ctermid (char *__s) __attribute__ ((__nothrow__ , __leaf__));
# 913 "/usr/include/stdio.h" 3 4
extern void flockfile (FILE *__stream) __attribute__ ((__nothrow__ , __leaf__));


extern int ftrylockfile (FILE *__stream) __attribute__ ((__nothrow__ , __leaf__)
) ;


extern void funlockfile (FILE *__stream) __attribute__ ((__nothrow__ , __leaf__)
);
# 943 "/usr/include/stdio.h" 3 4

# 2 "helloworld.c" 2
int main()
{
  printf("Hello World");
  return 1;
}
[anguyen5@gc112m30 QuestionB]$ gcc -c helloworld.c
[anguyen5@gc112m30 QuestionB]$ gcc -o helloworld helloworld.c
[anguyen5@gc112m30 QuestionB]$ ./helloworld
Hello World[anguyen5@gc112m30 QuestionB]$
```

Figure 6: Output of Question B

Question C: Explain the differences between what compiling the source code results in, in case of Java as opposed to what happens with C programs. In particular, explain why when running the Java program, you needed to use the java command while there was no command needed to run the C program. Support your answer with at least one reference (from the textbook, from the library or from the web).

In Java, when the source code is compiled, it will be "converted" to bytecodes. Meanwhile, the C code will be translated into a computer-readable file.

The reason why we must use the "java" command when running a Java program is that it will call the Java virtual machine interpreter, which converts the byte codes to platform-dependent machine codes so that the computer can understand and run the program. The C program had been translated to a computer-readable file in the compiling step, so it is unnecessary to use any command to do that step, we just need to run it.

Reference:

▶ Website: Essentials, Part 1, Lesson 1: Compiling & Running a Simple Program (oracle.com)
▶ Book: Intermediate C Programming – Yung-Hsiang Lu
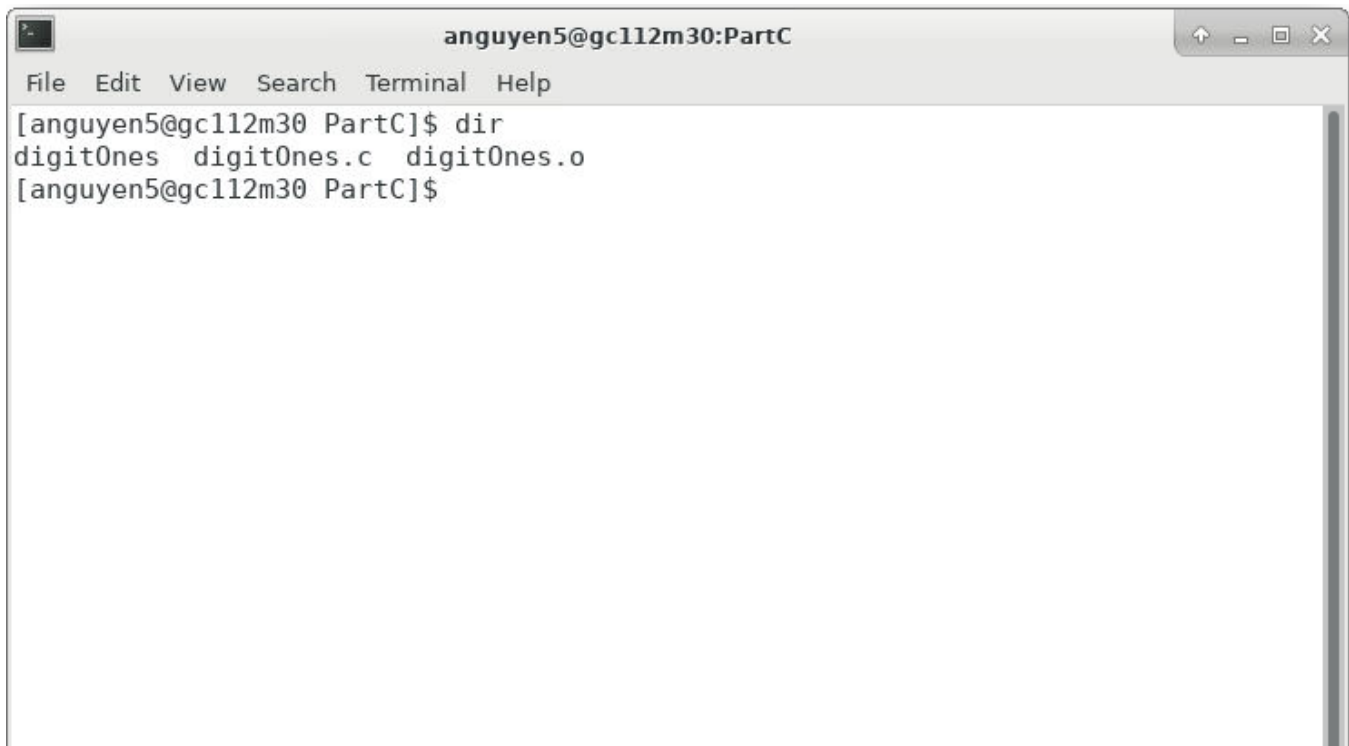▶ Lecture slide.

Repeated Digits:

Write a C program to count how many 1s are in the binary representation of a given number. For example, the number 52 is 110100 in binary and has three 1s.

```c
digitOnes.c                    Question1A.class

1   #include <stdio.h>
2   #include <stdlib.h>
3   #include <math.h>
4
5   int main(int argc, char **argv)
6   {
7       int value;
8       int iErr;
9       printf("Value to examine: ");
10      iErr = scanf("%d",&value);
11      if(value <= 0 || iErr != 1)
12      {
13          printf("Unable to read the value\n");
14      }
15
16      int i = 0;
17      int count = 0;
18      while(i <= value/2)
19      {
20          if(pow(2,i+1) > value && pow(2,i) <= value)
21          {int j;
22              for(j = i;j >= 0;j--)
23              {
24                  if (pow(2,j) <= value)
25                  {
26                      value -=pow(2,j);
27                      count++;
28                  }
29              }
30          }
31          i++;
32      }
33      printf("There are %d 1s",count);
34      return 0;
35  }
36
```

Figure 7: Source Code of the Question

Figure 8: Files of the Question

```
[anguyen5@gc112m30 PartC]$ gcc -c digitOnes.c
[anguyen5@gc112m30 PartC]$ gcc -o digitOnes digitOnes.o
digitOnes.o: In function `main':
digitOnes.c:(.text+0x83): undefined reference to `pow'
digitOnes.c:(.text+0xb5): undefined reference to `pow'
digitOnes.c:(.text+0xef): undefined reference to `pow'
digitOnes.c:(.text+0x129): undefined reference to `pow'
collect2: error: ld returned 1 exit status
[anguyen5@gc112m30 PartC]$ gcc -o digitOnes digitOnes.c
/tmp/ccVFmqrR.o: In function `main':
digitOnes.c:(.text+0x83): undefined reference to `pow'
digitOnes.c:(.text+0xb5): undefined reference to `pow'
digitOnes.c:(.text+0xef): undefined reference to `pow'
digitOnes.c:(.text+0x129): undefined reference to `pow'
collect2: error: ld returned 1 exit status
[anguyen5@gc112m30 PartC]$ gcc -o digitOnes digitOnes.c -lm
[anguyen5@gc112m30 PartC]$ ./digitOnes
Value to examine: 99
There are 4 1s[anguyen5@gc112m30 PartC]$ ./digitOnes
Value to examine: -1
Unable to read the value
There are 0 1s[anguyen5@gc112m30 PartC]$ ./digitOnes
Value to examine: 10000
There are 5 1s[anguyen5@gc112m30 PartC]$
```

Figure 9: Output of the Question