ACM tutoring is MTWR 3:30-5:00 in HAS 329.

Minute essay comments:

- Why learn binary representation of numbers?
- You are learning a different language.
- Negative numbers vs. large numbers.
- Is there a number you can represent as positive but not negative in 2s-complement?
- Who/what uses hex?
- Binary is not the same as log base 2. It is just base 2.
More

- Examples of piping.
- Meaning of literal.
- Quiz format: always EC, some different question styles will appear.
- Bad quiz grades.
- Adding binary number in Scala.
- Difference between 16-bit, 32-bit, and 64-bit computers.
- Difference between J and Scala.
- I hope you never become fluent enough in binary and unicode to read it.
Even More

- Not everyone thinks we are going slow.
- Control over output to force fewer digits on Double.
- We will code in vi and test in REPL. The vi code will be run as a script.
Hexadecimal

- Binary is unwieldy for humans because of the large number of digits.
- Hexadecimal (base 16) is commonly used because it converts nicely to binary, but has few digits.
- Four bits is a hex digit. Start at the right and group bits by 4.
- Use letters A-F for numbers 10-15.
- Hex literals start with 0x
- toHexString
Octal

- Octal (base 8) is less common than hex, but not uncommon.
- Group bits into groups of three.
- Octal literals and toOctalString().
The math Object

- For other math functions use methods on the math object.
- For example, use math.sqrt() to take the square root of a number.
The Char type represents a single character in Scala.

The literal for Char has the letter that you want in single quotes.

The Char is stored in the computer as a 16-bit unsigned integer encoded in Unicode.

Unicode has the alphabet of every written language in it.

You can convert to an Int to see the numeric values of characters.
Escape Characters

- Not all characters can be easily entered. For things you can't nicely type, use escape characters.
  - \n – for a new line
  - \t – for a tab
  - "" - to get a double quote
  - "' - to get a single quote
  - "\" - to get a backslash
Strings

- We have seen the String type and that represent String literals by putting characters in double quotes.
- Escape characters can also go inside of normal strings.
- Strings have many methods. We can see the basics using tab completion. (If we put in some extra parentheses.)
There are some situations when using escape characters is a pain.

For this, use triple double quotes to make a raw string.

Anything you type between the triple double quotes will go into the string.

They can span multiple lines even.
Variables

- It is very common to want to represent values with names.
- A variable is a name that we use to represent a value.
- In Scala we can declare variables using val or var.
  - `val name:Type = expression`
  - `var name:Type = expression`
- A val can't change it's value, a var can.
- The colon and type are generally optional.
Tuples

- Another type in Scala is the Tuple type.
- A tuple has comma separated values in parentheses.
- They give us a way to handle a fixed set of associated values.
- Assignment into a tuple does pattern matching.
We have spent most of our time in the REPL entering one statement at a time.

When we want to do things repeatedly it is nice to put the commands in a file called a script.

We can use vi to write a script and put Scala commands in the file.

We can run it by specifying the file name after the command scala.

Alternately, we can load it into the REPL.
Sequential Execution

- When you put commands into a script, they are normally executed one after the other from top to bottom.
- This is what we call sequential execution and it is the default way things happen.
- Order can be very significant for the instructions in a program.
Scala provides a whole set of functions you can call to read from standard input.

- `readInt()`
- `readDouble()`
- `readLine()`
- And many more

This can make your scripts far more useful as they can be used with different values each time you run them.
Some Problems

- We are still a little limited in that we can only do simple math and formatting, but let's try to do some things with that in scripts.
- We'll start with formatting money.
- Calculating hourly wages?
- Taking averages of grades?
- Suggestions?
What questions do you have about the topics we have been working on?