last time in cs1007...

- course objectives
- policies
- academic integrity
- resources
  - WEB PAGE: *http://www.columbia.edu/~cs1007*
- NOTE CHANGES IN ASSESSMENT — 5 EXTRA CREDIT POINTS ADDED

recitations.

- sign up for a recitation (sign up sheet circulating in class)

day	date	time	room
recitation #1	Mon	9.00am – 10.00am	252 ET – Dali
recitation #2	Mon	7.00pm – 8.00pm	407 Math – Steve
recitation #3	Mon	8.00pm – 9.00pm	407 Math – Jonah
recitation #4	Tue	7.00pm – 8.00pm	407 Math – Don
recitation #5	Wed	12.00pm – 1.00pm	252 ET – Lyndon
recitation #6	Thu	6.00pm – 7.00pm	407 Math – Min

- ET = Engineering Terrace
- starting next week (week of Sep 9)
- this is where you will get back your homeworks!!

today's topics.

- computer basics
- creating your first program
- editing, compiling, linking, running
- output
- data types
- reading: *ch 1, ch 2.1-2.4*

computer commands.

- computer follows commands
  commands = series of instructions
- you will learn how to *command* a computer
  command = program = write instructions
- you understand the commands,
  but does the computer?
  that's a question of cognition...
  $\rightarrow$ Artificial Intelligence, Cognitive Science

computer components.

- computer = hardware + software
- a computer is organized into *logical units*:
  - input
  - output
  - memory
  - arithmetic and logic (ALU)
  - central processing (CPU)
  - secondary storage

computer instructions.

- set of instructions = *program*
- types of instructions:
  - machine language
  - assembly language
  - high-level language (e.g., C, C++, Java)
- program is *compiled* into machine language and then *executed (ran)*
- *executing (running) program = job = process = task*

machine language.

- lowest level
  - numeric
- computer is comprised of zillions of *switches* or *relays*
  - switches = ON or OFF
  - relays = OPEN or CLOSED
- hardware position is abstracted into software as 1's and 0's
- 1's and 0's $\Rightarrow$ *base 2*, or *binary*

assembly language.

- medium level, but still pretty low; i.e., hard to read and understand
- "English" words and abbreviations
- examples:
  LOAD
  ADD
  SHIFT
  STORE

high-level languages.

- examples: C, BASIC, FORTRAN, Pascal, C++, Java, LISP, Scheme
- even more like “English”
- high-level languages are
  1. *compiled* into machine language or *object code*
  2. *linked* into *executable code*
  3. *executed* or *ran* as programs

language examples.

- machine language:
  +1300042774
  +1400593419
  +1200274027
- assembly language:
  LOAD BASEPAY
  ADD OVERPAY
  STORE GROSSPAY
- high-level language:
  grossPay = basePay + overTimePay;

Java.

- Java is an *object-oriented* language: it is structured around *objects* and *methods*, where a method is an action or something you do with the object
- Java programs are divided into entities called *classes*
- some Java classes are *native*
  but you can also write classes yourself
- Java programs can run as *applications* or *applets*

your first application.

“hello world”

- typical first program in any language
- output only (no input)

the application source code.

file name = hello.java

```
/*-------------------------------------------------------
   Prof Sklar, 05-Sep-02, hello.java

   This class demonstrates output from a Java application.
-------------------------------------------------------*/
public class hello {
    public static void main ( String[] args ) {
        System.out.println( "hello world!\n" );
    } // end of main()
} // end of class hello()
```


output.

- like filling in graph paper
- *methods*
  `System.out.println( )`
  `System.out.print( )`
- *arguments*
  - those things inside the parenthesis ( )
  - one or more Strings, separated by "+" 's
  - escape sequences: \n, \t
  - also called *parameters*
- example
  `System.out.println( "The quick" + ", brown " + "fox" );`

things to notice.

- Java is CASE sensitive
- punctuation is really important!
- *whitespace* doesn't matter for compilation
- *BUT* whitespace DOES matter for readability and your grade!
- file name is same as class name

try it yourself.

1. log into CUNIX
2. create the application source code file,
   using the *emacs* editor
3. compile the source code,
   using the *javac* command
4. execute the program using the *java* command

quick and dirty UNIX.

- UNIX is an operating system,
  – *Linux* is a version of UNIX
- command-line interface
  – commands have options, also called *switches*
- here are some commands:

```
ls     -- list the files in the current directory
cp     -- copy a file
mv     -- rename a file
rm     -- delete (remove) a file
cd     -- change directory
pwd    -- show the current directory
man    -- help
chmod  -- change file protections
```


quick and dirty *emacs*.

- at the UNIX prompt: `unix> emacs hello.java`
- emacs is a "control key" editor
- here are some commands:

```
Ctrl-B          -- move cursor back
Ctrl-F          -- move cursor forward
Ctrl-P          -- move cursor to previous line
Ctrl-N          -- move cursor to next line
Ctrl-D          -- delete character under cursor
Ctrl-X Ctrl-S   -- save the file
Ctrl-X Ctrl-C   -- exit emacs
Ctrl-H          -- help
ESC             -- escape! gets you out of trouble!
```


data types.

- programs = objects + methods
- objects = data
- data must be *stored*
- all storage is numeric (0's and 1's)

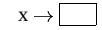
memory.

- think of the computer's memory as a bunch of boxes
- inside each box, there is a number
- you give each box a name
  $\Rightarrow$ defining a *variable*
- example:

program code:

```
int x;
```

computer's memory:



variables.

- variables have:
  - name
  - type
  - value
- naming rules:
  - names may contain letters and/or numbers
  - but cannot begin with a number
  - names may also contain underscore (_) and dollar sign ($)
  - underscore is used frequently; dollar sign is not too common in Java
  - can be of any length
  - cannot use Java keywords
  - Java is *case-sensitive!!*

primitive data types.

- numeric

byte	8 bits	-128 = -2^7	127 = 2^7 - 1
short	16 bits	-32,768 = -2^{15}	32,767 = -2^{15} - 1
int	32 bits	-2^{31}	2^{31} - 1
long	64 bits	-2^{62}	2^{63} - 1
float	32 bits	$\approx$ -3.4E+38, 7 sig dig	$\approx$ 3.4E+38, 7 sig dig
double	64 bits	$\approx$ -1.7E+308, 15 sig dig	$\approx$ 1.7E+308, 15 sig dig

- boolean

boolean	1 bit

- character

char	16 bits

assignment.

- = is the assignment operator
- example:

program code:

```
int x; // declaration
x = 19; // assignment
```

or

```
int x = 19;
```

computer's memory:

x → 19

to do.

- get the textbook, and read chapter 1 and 2.1 – 2.4
- sign up for a rectiation
- try logging into your CUNIX account
- check out the class web page:
  http://www.columbia.edu/~cs1007

Have a good weekend!