Week 1 Discussion

Wednesday, 10/2/19

Reminders

PSA0 due Tuesday, October 8 11:59pm

Quiz 1 in-class next Wednesday (October 9)

Today's agenda

Logistical note

Style guidelines

PSA0 REVIEW
    Terminal + remote connection to ieng6 server
    Shell commands good to know for now
    Vim overview + commands
    Java program compilation + execution
    Java program testing
    Secure copying files between ieng6 server and local machine
    PSA0 programming problems

Structure of discussion

Mainly for reviewing PSA details + relevant course concepts for PSAs.

May have worksheet handouts certain weeks.

Discussion will be podcasted.

Slides will be posted online.

Worksheet handouts will **NOT** be posted online.

Read the writeup before discussion to get the most out of it.

Attendance

We will be using clickers.

Attending discussion allows students to make up to **3 points** of their assignment lost points.

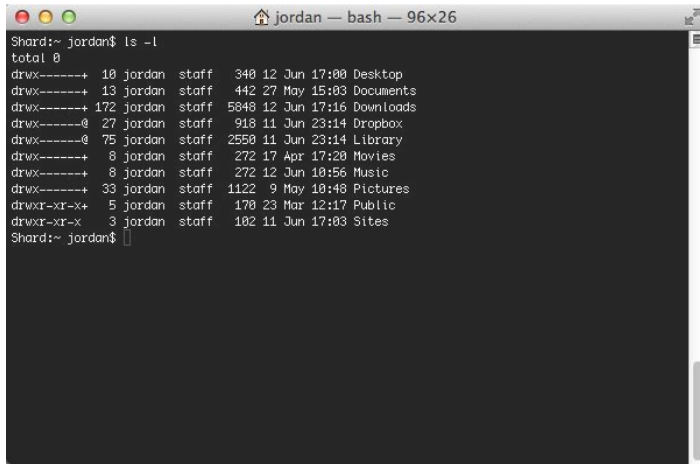Assignment points cannot exceed 100%. Discussion attendance is **not** extra credit.

Other logistical notes

- Utilize Piazza efficiently. Search before posting.
- Autograder. Queue closed when on duty tutor finishes their scheduled hours. Do not guarantee to finish all the tickets even if you managed to get onto the queue.
- Only TWO get out of jail card.
- PA0 will be showing all tests upon submission. This will **NOT** be the case for future assignments.

Style guidelines

1. File headers
2. Class headers
3. Method headers
4. Inline comments
5. Proper indenting
6. Proper variable name (no numbers & no single letter var except loop condition)
7. No magic numbers
8. Short methods
9. Short lines
10. Javadoc style comments

Terminal


```
Shard:~ jordan$ ls -l
total 0
drwx------+  10 jordan  staff   340 12 Jun 17:00 Desktop
drwx------+  13 jordan  staff   442 27 May 15:03 Documents
drwx------+ 172 jordan  staff  5848 12 Jun 17:16 Downloads
drwx------@  27 jordan  staff   918 11 Jun 23:14 Dropbox
drwx------@  75 jordan  staff  2550 11 Jun 23:14 Library
drwx------+   8 jordan  staff   272 17 Apr 17:20 Movies
drwx------+   8 jordan  staff   272 12 Jun 10:56 Music
drwx------+  33 jordan  staff  1122  9 May 10:48 Pictures
drwxr-xr-x+   5 jordan  staff   170 23 Mar 12:17 Public
drwxr-xr-x    3 jordan  staff   102 11 Jun 17:03 Sites
Shard:~ jordan$
```

An interface where you can interact with the computer using commands

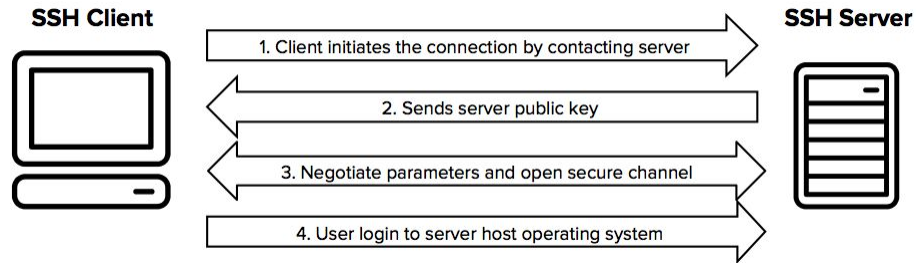All computers (Windows, Macs, Linux) have a terminal

Differences in terminals across different operating systems

ieng6 server

ieng6 server is a computer system (with Linux operating system) at UCSD that contains resources for you to work on PSAs

Can access the server remotely through lab computers or personal computer

SSH Client

1. Client initiates the connection by contacting server

2. Sends server public key

3. Negotiate parameters and open secure channel

4. User login to server host operating system

SSH Server

Connecting to ieng6 server

Through lab machine	Through Windows	Through Mac
1. Open terminal 2. Type in `ssh -X username@ieng6.ucsd.edu` **Highly recommended to use the lab machines for PSAs**	1. Download + install MobaXterm 2. Launch MobaXterm 3. Create new SSH session 4. Specify host as `ieng6.ucsd.edu` and username as your ieng6 username 5. Launch that SSH session	1. Open terminal 2. Download + install XQuartz 3. Restart computer 4. Launch XQuartz 5. Type in `ssh -Y username@ieng6.ucsd.edu` **Only do steps 2-4 if you need to run a graphical program**

Terminal commands

ASSUMING YOU ARE USING LINUX OR MAC, DIFFERENT ON WINDOWS

Enter a directory: `cd directoryName`

Go back to its upper directory: `cd ..`

    `.` is current directory and `~` is home directory

Create a directory: `mkdir directoryName`

Print out current directory: `pwd`

Terminal commands

- List files in the current directory
  - ls
  - ls -a
  - ls -l
- View a specific file
  - cat fileName
  - more fileName
- Create a file:
  - touch fileName

Vim overview

Vim is a text editor which you can use from the terminal.

For Mac and Linux, the system should already have Vim.

For Windows:

1. go to http://www.vim.org and download the vim version you want.
2. Make sure to check the box allowing vim to be used from command prompt
3. Open up your computer's environment variables
4. Add a new variable and enter vim's path as the value (ex: C:\Program Files (x86)\Vim\vim80)
5. Now you can use vim from your command prompt!

Vimrc file

The vimrc file provides configurations for Vim (very useful if you are going to spend tens of hours working on programming assignments).

Examples: auto completion, text highlighting, indentation, etc.

Where to find and save vimrc?
For Linux: /home/user/.vimrc (for a specific user)
            /etc/.vimrc (for all users)

For Windows: C:\Users\<username>_vimrc

Vimrc file

Highly recommended options:
- set wildmenu   Turn on wild menu
- set hidden   Don't unload buffer
- set hlsearch   Highlight search results
- set number   Line numbers
- set ruler   Always show current position
- set modeline   Show what I'm doing
- set backspace=eol,start,indent   Allow backspaces
- set showcmd   Shows what command you are typing

Vim commands + navigation

There are three modes of Vim: **command mode**, **insert mode**, and **last line mode**.

- Command mode: Press esc from other mode to enter command mode. The mode you start in when you open Vim. Here, you can issue commands to Vim.

- Insert mode: Press i from command mode to enter insert mode. Here, we can type and write code. Press escape to go back to command mode.

- Last line mode: Press : from command mode to get here. Allows us to perform operations (quit, save, search, etc.) You can press escape twice to go back to command mode.

Vim commands + navigation

Exiting Vim:

- :q Quit Vim. This fails when changes have been made

- :q! Quit without writing.

- :cq Quit always, without writing.

- :wq Write the current file and exit.

- :wq! Write the current file and exit always.

Vim commands + navigation

Inserting text:

- a Append text after the cursor.

- A Append text at the end of the line.

- i Insert text before the cursor.

- I Insert text before the first non-blank in the line.

- o Begin a new line below the cursor and insert text.

- O Begin a new line above the cursor and insert text.

Vim commands + navigation

Deleting text:

- `<Del>` delete characters under and after the cursor.
- `x` delete characters before the cursor.
- `dd` delete the whole line.

Vim commands + navigation

Other common used shortcuts:

- u Undo change
- U Undo all latest changes
- Ctrl + r redo last undo
- k Up
- h Left
- l Right
- j Down
- ^ To the first non-blank character of the line.
- $ To the end of the line.
- /pattern Search words

Java program compilation

2-stage process to run Java program: compilation --> execution

Compile Java code using **javac**

To compile one Java file:

- `javac filenameOne.java`

To compile multiple Java files:

- `javac filenameOne.java filenameTwo.java`

Java program compilation

Compilation creates **.class** or **.jar** files

Execute Java code using **java**

To execute Java file with entry point (contains main method):

- java filenameOne

Note: Check your java version if you are not using lab machines.

- java -version

Demo

PSA 0 programming portion

```
public static String changeBase (String number, int inputBase, int outputBase)

public static int checkChar (char ch, int inputBase)
```

Number system

Some common number systems:

- Base 2 (Binary)
- Base 8 (Octal)
- Base 10 (Decimal)
- Base 16 (Hexadecimal)

We represent those using [0-9] and [A-Z] for this assignment.

A system with base x has only x different digits.

static int checkChar (char ch, int inputBase)

- **Assuming inputBase is valid, meaning 2 to 36 inclusive at both ends.**

Input Base	Valid characters
2	0, 1
3	0, 1, 2
4	0, 1, 2, 3
...	...
16	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F
...	...
36	0, …, 9, A, …, Z

static int checkChar (char ch, int inputBase)

- **Mapping**

Character	Value
'0'	0
...	...
'9'	9
'A'	10
...	...
`Z`	35

static String changeBase (String number, int inputBase, int outputBase)

- **check for validity (number, inputBase, and outputBase)**

- **empty strings should return 0**

- **capitalize all letters in String number**

    - **hint: is there a method that can do this for you?**

- **strip all invalid characters (make sure to use checkChar())**

- **convert the valid String to the number in the correct base**

Integer class methods

- [Integer documentation](#)

- `static int parseInt(String s, int radix)`

    - returns the integer representation of `s` in base `radix`

    - example:

        - `System.out.println(Integer.parseInt("1101", 2));`

        - output: 13

- `static String toString(int i, int radix)`

    - returns the String representation of `i` in base `radix`

    - example:

        - `System.out.println(Integer.toString(13, 2));`

        - output: 1101

Worksheet