Programming Assignment 4: The Bash Shell Programming
CSC 4103: Operating Systems, Spring 2015

Due: May 2nd, Saturday (by 10:00 PM)
Total Points: 10

Objective
To learn the use of bash shell scripting.

Background
The bash shell scripting is a powerful tool to execute a batch of Unix commands for completing a complicated task. In the class, we have learned the basics of bash Shell programming. This project is a programming practice to use shell for image processing.

Programming Task
Download the face image database at the link `http://www.csc.lsu.edu/~fchen/class/csc4103-sp15/assignments/lfw.tgz`, which is a subset of the full image database from UMass [1]. Download and untar the package. This package contains a set of directories, each of which contains one or more images. You are required to write a shell script (`batch_resize.sh`) to process this face recognition image database by following the guideline below.

1. Your script should provide a help page. Typing command "`%./batch_resize.sh help`" should print help info to explain how to use the script.
2. The shell script `batch_resize.sh` should accept three parameters to allow users to specify (1) the input directory of the image database, (2) the output directory of the processed image database, and (3) the resize ratio(s), in this order. An example command:

   ```
   %./batch_resize.sh input_dir output_dir "10 30 50"
   ```

   If the output directory exists, a warning message should be printed and exit. If the output directory does not exist, the directory will be created to contain output images. Also, the user should be able to specify a sequence of resize ratio (e.g., 50 represents 50%, 20 represents 20%, and so on so).
3. The output directory should retain the same directory structure of the input directory.
4. For each image in the input directory, the script should produce a set of resized images as specified by the command parameters with appropriate naming. For example, for resizing image `foo.jpg` by 50%, the output image should be named as `foo-r50.jpg`. The resized images should be placed in the same subdirectory of the original image.
5. After an image has been processed, print info to the screen to show (1) the name of the original image, (2) the original size of the image, (3) the name of the resized image, (4) the size of the resized image.
6. After all images have been processed, print info to the screen to show (1) the total number of files being processed, (2) the total size of original files, and (3) the total size of the resized files.
7. Your shell script must use functions to organize your code.

Note: Compile and test-run your code on the classes server. Submit your work as instructed and verify your submission. Late submissions will be penalized at the rate of 1 point per delayed day.

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Additional Hints

(1) Use the following command to download and unzip the tar ball.

```
$ wget http://www.csc.lsu.edu/~fchen/class/csc4103-sp15/assignments/lfw.tgz
$ tar -zxvf lfw.tgz
```

(2) Use the following command to resize an image.

```
$ convert -resize <percentage> <input image> <output image>
```

For example, we can use the command "`$ convert -resize 50% foo.jpg foo-r50.jpg`" to resize foo.jpg by 50%.

(3) Use the following command to extract the first half of the file name.

```
$ echo <file name> | cut -d '.' -f 1
```

For example, "`%echo foo.jpg | cut -d '.' -f 1`" will output `foo`.

(4) Use the following command to get file size in bytes.

```
$ wc -c  <file name> | awk '{print $1;}'
```

(5) Use `man` command to get extra help info about the commands.

Submitting Your Work

All files you submit must have a header with the following:

Name:	Your Name (Last, First)
Project:	PA-4 (Shell Programming)
File:	filename
Instructor:	Feng Chen
Class:	cs4103-sp15
LogonID:	cs4103xx

You need to use the server "**classes.csc.lsu.edu**" to work on the assignment. You can login to your account in the server using SSH. Create a directory **prog4** (by typing **mkdir prog4)** in your home directory in which you create your program or source code.

Make sure that you are in the **prog4** directory while submitting your program. Submit your assignment to the grader by typing the following command:

~cs4103_chf/bin/p_copy 4

This command copies everything in your prog2 directory to the grader's account. Check whether if all required files have been submitted successfully:

~cs4103_chf/bin/verify 4

Reference

[1] http://vis-www.cs.umass.edu/lfw/lfw.tgz

Note: Compile and test-run your code on the classes server. Submit your work as instructed and verify your submission. Late submissions will be penalized at the rate of 1 point per delayed day.