**Pre-reading for Grads prior to joining Pathshala**

All the below exercises should be done in Linux only.

1. Data structures
   1. Learn about sorting, searching, stack, linked list, maps, queue, circular queue, trees, binary search trees, graphs, hash and especially their usage, run time / space complexity and applications.
2. Operating Systems
   1. Install any linux based operating system using Virtual Box. Follow the link: <http://www.wikihow.com/Install-Ubuntu-on-VirtualBox>
   2. After installing Linux, find out how to determine the OS architecture? (Is it 32 bit or 64 bit)
   3. How to shutdown the OS from command line.
   4. Learn how to install programs like VIM, GIT from command line. e.g:- This teaches you how to use package manager.
   5. Find out what shell you are using. (This should teach you about environment variables)
   6. Read what cat, ls, sed, awk, grep, ln, rm, file, which, commands does ? Do not use internet to find what these commands does ? In the command line launch man <command name>. This should teach how to read man pages.
   7. Find out which processes are taking more memory from command line ?
   8. How do you terminate one process from command line ?
   9. what is a symlink ? And how to you create one ?
3. Networking
   1. Learn the following commands(in linux) and their respectives uses
      1. ping.
      2. nslookup.
      3. what does route command display
      4. command to find ip address and mac id of the interface
      5. find hostname of the machine.
      6. Install sshd and connect to the machine where sshd is installed from another machine.
         1. After installing sshd, verify if the sshd is running and find out with what port number did the process acquired ?
      7. Install FTP and learn how to upload and download files.
4. Programming Languages
   1. Learn scripting language
      1. Learn BASH shell scripting: <http://linuxconfig.org/bash-scripting-tutorial>
   2. Learn C language
      1. Learn how to compile small C programs in Linux
      2. Identify what version of the c language you are using to compile.
      3. Learn to create header files
      4. Learn about reusable libraries.
      5. Learn how to create static and dynamic libraries.
      6. Learn about ‘make’
   3. Learn Java language
      1. Learn how to compile and run java programs in command line in linux
      2. Read “Head first Java” book
   4. Learn Python language
      1. Complete the exercises at <http://learnpythonthehardway.org/book/>
5. Security
   1. What is message digest, hashing.
   2. Learn about PKCS, encryption and different algorithms.
   3. Install gnupg
   4. Learn how to encrypt and file and decrypt a text file using GnuPG (or GPG) with 3DES
   5. What is the SHA256 value of text “Hello World” ? Calculate using gpg
   6. Learn about ssh.
      1. Generate public and private keys
      2. Login to the Linux VM using SSH from your host (windows) operating system.
      3. Using command and SSH from your host operating system, copy files to/fro to your host and linux box.
      4. learn to create public and private keys using ssh-keygen
6. Virtual machines (also known as - VM’s)
   1. Read about virtualbox: <https://www.virtualbox.org/manual/UserManual.html>
   2. Learn about different networking concepts in virtual box. This information is available in virtualbox documentation.
   3. Create two linux VM’s on existing laptop. Create a network between your host and two VM’s. From each VM you should be able to ping other VM.
7. Database management
   1. Install Postgresql in linux
   2. ACID principles
   3. Basic SQL queries
   4. Normalization principles
   5. Various joins
   6. Read about indexing, and how to create indexes on columns.
8. Text Editors
   1. Learn VIM the hard way, <http://learnvimscriptthehardway.stevelosh.com/>
9. Web
   1. What happens when you type [www.google.com](http://www.google.com) in your browser ? Read the following link to know more: <https://github.com/alex/what-happens-when>
   2. What are cookies ? How do you see what is there inside a cookie ?
   3. What is http request and http response ?, Use curl command to search google without using the browser.
   4. What does http request and response headers contain ?
   5. What does http response codes 200, 404 mean ?
   6. How is http different from https ? Which ports does http and https use ?
      1. How can you send search request to [www.google.com](http://www.google.com) from command line.
   7. Read about various http methods GET/POST/PUT/HEAD. What are its uses and when should i use each one. Learn how to use curl command with of these (GET/POST/PUT/HEAD).
   8. What is ajax and what does XHR means for you.
   9. Read about JSON and solve the below problem
      1. Design data structure that represents all students and their respective marks in each subject in each year of engineering in JSON format.
   10. Read about REST at this url <http://code.tutsplus.com/tutorials/a-beginners-guide-to-http-and-rest--net-16340>