Introduction to Software Systems (CS6.201)

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Shell Variables

Variables can be declared using the `declare v_name` syntax. They have no datatype. Assignment is done using the `=` operator.
Variables are lost as soon as the terminal window is closed. If they need to be permanent, they need to be added to the `.bashrc` file.
To print or access the value of a variable, its name must be prefixed with `$`.

If statements have the following syntax:

```
if cond
    then
    block
fi
```

The condition should be preceded by the `test` command.
When a variable is to be printed, its name has to be enclosed in single quotes, as in `'$v_name'`. When it has to be compared or passed, it must be enclosed in double quotes, as in `"$v_name"`.

There are some *special variables*. `$0` holds the name of the command being executed and `$1` to `$9` hold the command-line arguments passed to the executable file. `$?` represents the outcome of the previous command; it is 0 in case the command was executed successfully.

Piping and Redirection

We use piping to pass the output of one command to another command as input. For example, if we want to know the number of files in a folder, we can run count the number of words in the output of the `ls` command, as `ls -a | wc -l`.
We can also redirect output, as in `cat hello.txt > /dev/stdout`. `>` redirects content from file to file.
To redirect an environmental variable to a file, we need to use `>>`; for example, `echo $HOSTNAME >> $HOSTNAME"_stats.txt"`.
To run a command *inside* an `echo` statement, use backticks, as in `echo` `` `uname -a` `` `> file.txt`.

Expressions

There are multiple ways to evaluate mathematical expressions in the shell.
1. `let v_name=<expression>`. This does not print the value; to print it, we

run `echo $v_name`.
2. `expr <expression>` evaluates and prints the value, but the values in the expression should be space-separated (they are distinct arguments to `expr`).
3. `(( <expression> ))` results in the evaluation of the expression as well.
4. The basic calculator `bc`, for example `echo "10+5" | bc`. Expressions have to be piped to it.