Introduction to Programming
The tcsh Shell

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OS = manager of everything!
Display

Window Manager

Operating System

Shell

console

bash

sh

csh

tcsh

etc...
tcsh, the tee-fee-fee-shell

http://en.wikipedia.org/wiki/Tcsh
History

- The built-in `history` command displays the previously-entered commands.
- Use of ↑ / ↓ at the command line to allow the user to select a command from the history to edit/execute.
- Invoking previous commands using `command history`:
  - `!!` executes the previous command.
  - `!n` executes the nth command that was previously executed.
  - `!-n` executes the command that was executed n commands ago.
  - `!string` executes the most recently executed command that starts with string.
  - `!?string` executes the most recently executed command that contains string.
- Using history in new commands:
  - `!*` - refers to all of the arguments from the previous command.
  - `!*` - refers to the last argument from the previous command.
  - `!*` - refers to the first argument from the previous command.
  - `!*` - refers to the nth argument from the previous command.
  - `!*` - refers to the mth through nth arguments from the previous command.
  - `!*` - refers to the nth through the last argument from the previous command.
Variables

```
beowulf2:~$ handout> set x=100
beowulf2:~$ handout> echo $x
100
beowulf2:~$ handout> set name=Sophia
beowulf2:~$ handout> echo $name
Sophia
beowulf2:~$ handout> set fullName="Smith College"
beowulf2:~$ handout> echo $fullName
Smith College
beowulf2:~$ handout> set files=`ls`
beowulf2:~$ handout> echo $files
file1.txt file2.txt file3.txt fulghum generateDNAFiles.py generateDNA.py last.txt README temp/ ulysses.txt
beowulf2:~$ handout>
```
Loops

```bash
beowulf2:~$ handout> foreach x ( one two three )
foreach? echo $x
foreach? end
one
two
three
beowulf2:~$ handout>
```
More Loops
Linux Command: grep

```
beowulf2:~/temp> getcopy ulysses.txt
beowulf2:~/temp> grep magenta ulysses.txt
of an elder in Zion and a smokingcap with magenta tassels. Horned
beowulf2:~/temp>
beowulf2:~/temp> grep -i magenta ulysses.txt
of an elder in Zion and a smokingcap with magenta tassels. Horned
beowulf2:~/temp> wc ulysses.txt
  32663  264965  1520798  ulysses.txt
beowulf2:~/temp> wc -l ulysses.txt
32663  ulysses.txt
beowulf2:~/temp> ```
Linux Commands: tail & head

```
beowulf2:~/.temp> head -7 ulysses.txt
ULYSSES

by James Joyce

beowulf2:~/.temp> tail -7 ulysses.txt
heart was going like mad and yes I said yes I will Yes.

Trieste-Zurich-Paris 1914-1921
```

(No) Redirection

```
java HelloWorld
Hello World!
```

```
ls -1
file1.txt
file2.txt
file3.txt
```
Redirection

stdin → Program → output file

java HelloWorld > outputFile.dat

ls -1 > listFiles.txt

cat listFiles.txt
  file1.txt
  file2.txt
  file3.txt
Repeated Redirection

stdin → Program → output file

```
java HelloWorld > outputFile.dat
java OtherProg >! outputFile.dat

head -10 ulysses.txt > sample.txt
echo “…”        >> sample.txt
tail -10 ulysses.txt >> sample.txt
```
Redirection

cat > data.in
1
2
3
^D
java MyProg < data.in
Redirection

input file → Program → output file

`wc < ulysses.txt > ulysses.info`

`cat ulysses.info`

32663  264965  1520798
Pipes

grep orange ulysses.txt | wc -l

grep orange ulysses.txt | tail -3
Problem:

- Get several DNA files from [http://cs.smith.edu/~212/DNAFiles/](http://cs.smith.edu/~212/DNAFiles/), named **DNA_0000.txt** to **DNA_0099.txt**

- Find how many files have the special string “CGTGACTCAA” in them, aka **TPA-response element**.

- Identify the files.
Summary

• Using programming languages, one writes programs where the library functions allow one to manipulate data.

• Using shell commands, one can write programs, called scripts, where the functions available are operating-system commands, allowing one to manipulate operating system objects, such as files, Web data, devices, network information, or user information.