



# The Unix Shell

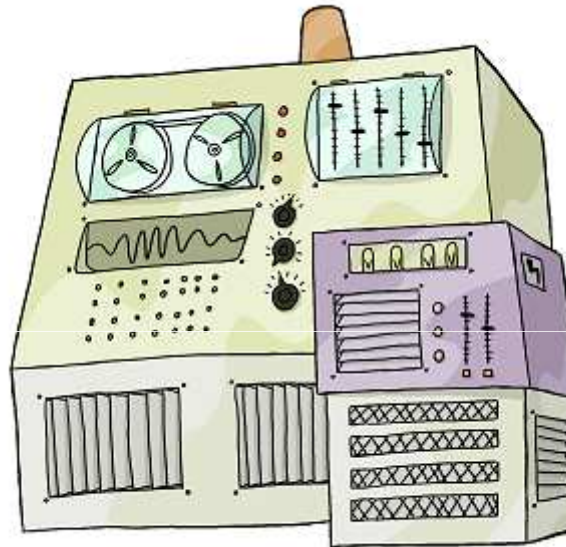
## Files and Directories



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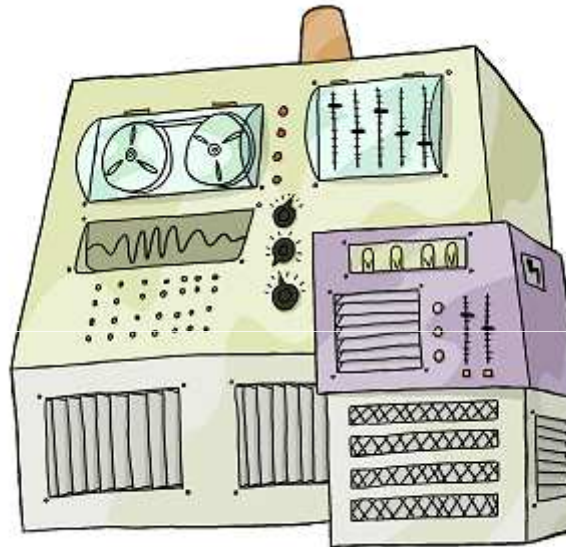


Run  
Programs

Store  
Data

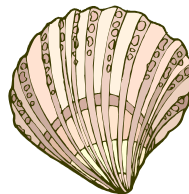
Communicate  
with each other

Interact  
with us



Run  
Programs

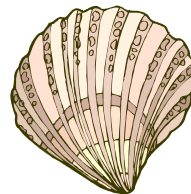
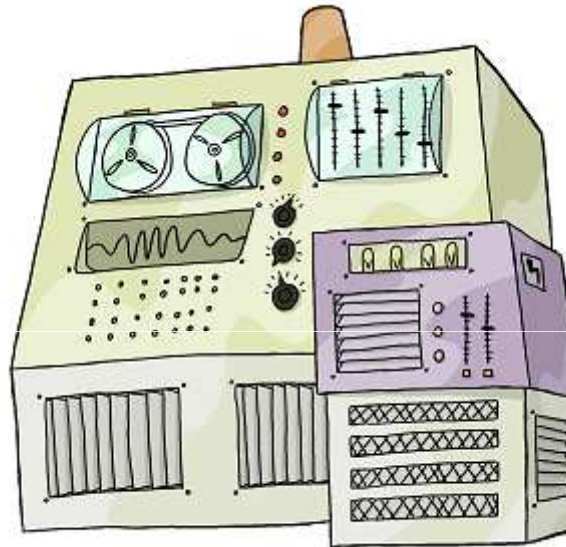
Store  
Data



shell

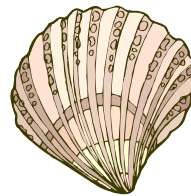
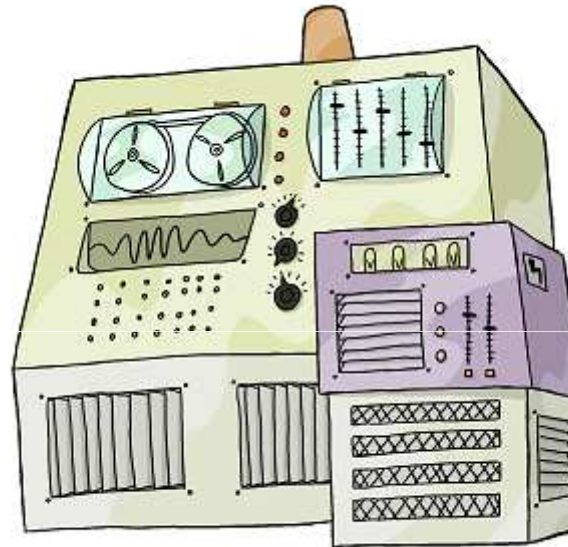
Communicate  
with each other

Interact  
with us



shell

Store  
Data

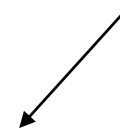


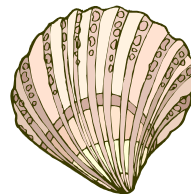
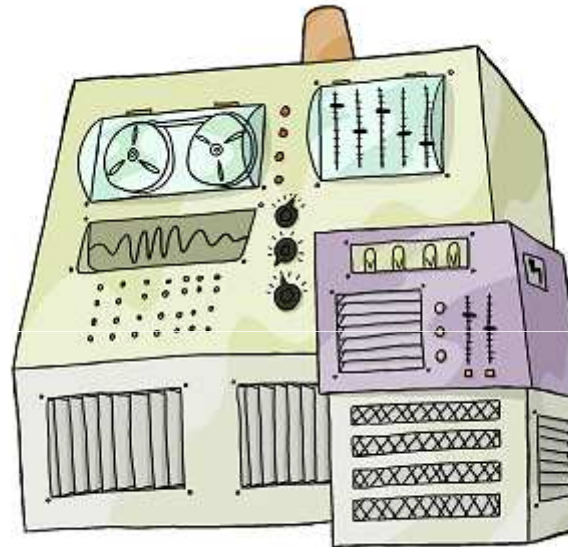
shell

Store

Data

file system





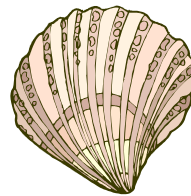
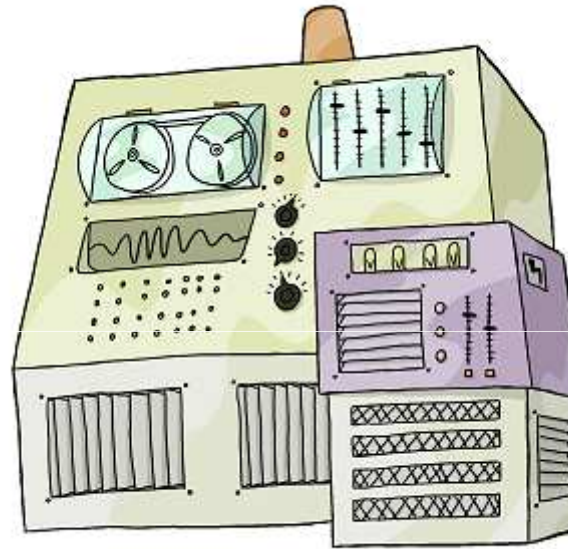
shell

Store

Data

file system

files



shell

Store

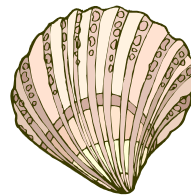
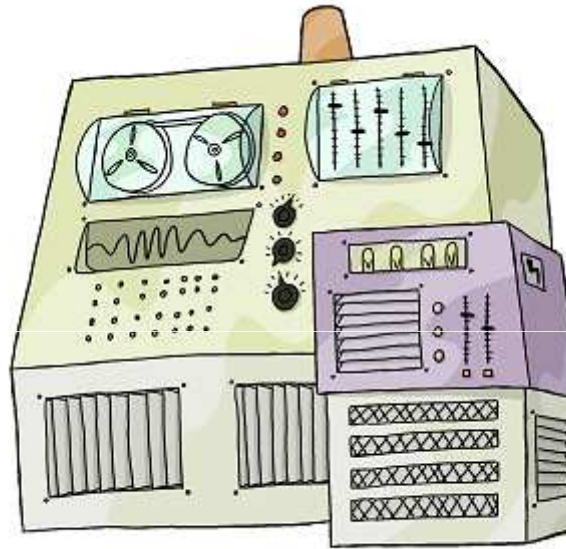
Data

file system

files

directories





shell

Use the shell  
to view and change  
the file system

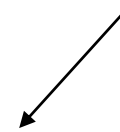
Store

Data

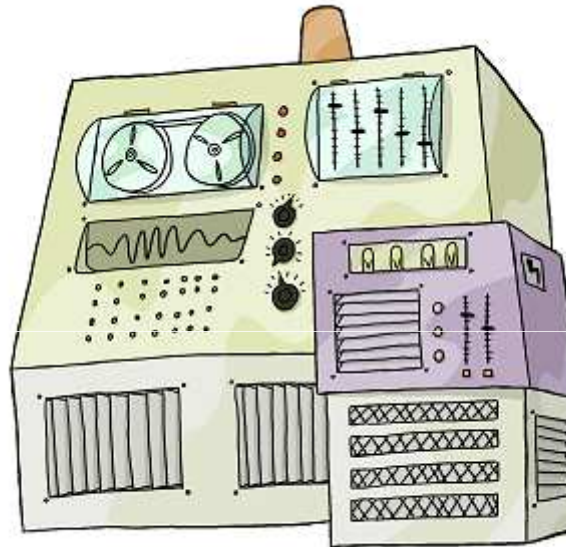
file system

files

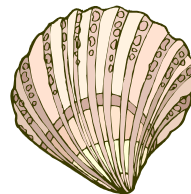
directories







Use the shell  
*to run commands*  
 to view what's in  
 the file system



shell

Store

Data

file system

files

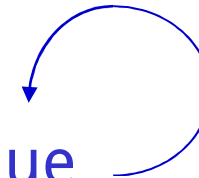
directories

login:

login:      ←      computer prompt in **bold**

login: ← computer prompt in **bold**

↑  
explanatory text in blue



login: vlad ← user input in green

login: vlad

password: \*\*\*\*\*(\*)\*\* ← password

login: vlad

password: \*\*\*\*

\$ ← shell prompt



login: vlad

password: \*\*\*\*

\$



shell prompt

like Python's >>> and ...

```
login: vlad
```

```
password: ****
```

```
$ whoami
```

← check user ID

login: vlad

password: \*\*\*\*

\$ whoami



check user ID

shell finds the whoami program

```
login: vlad
```

```
password: ****
```

```
$ whoami
```



check user ID

shell finds the whoami program

runs it

login: vlad

password: \*\*\*\*

\$ whoami

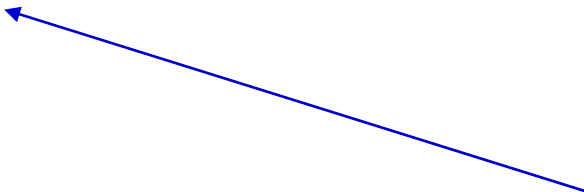
*vlad*

check user ID

shell finds the whoami program

runs it

prints its output



```
login: vlad
```

```
password: ****
```

```
$ whoami
```

```
vlad
```

```
$
```

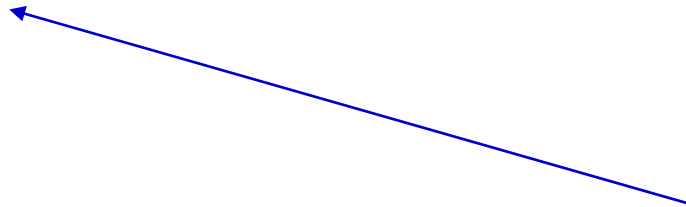
check user ID

shell finds the whoami program

runs it

prints its output

displays a new prompt



```
login: vlad
```

```
password: *****
```

```
$ whoami
```

```
vlad
```

```
$ pwd
```



what is the *working directory*



```
login: vlad
```

```
password: *****
```

```
$ whoami
```

```
vlad
```

```
$ pwd
```



what is the *working directory*  
the directory used when no other  
directory is explicitly specified

```
login: vlad
```

```
password: *****
```

```
$ whoami
```

```
vlad
```

```
$ pwd
```

```
/users/vlad
```

```
$
```

```
login: vlad
```

```
password: *****
```

```
$ whoami
```

```
vlad
```

```
$ pwd
```

```
/users/vlad
```

```
$
```



root

```
login: vlad
```

```
password: *****
```

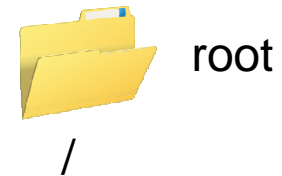
```
$ whoami
```

```
vlad
```

```
$ pwd
```

```
/users/vlad
```

```
$
```



```
login: vlad
```

```
password: *****
```

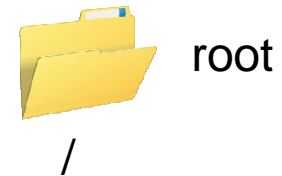
```
$ whoami
```

```
vlad
```

```
$ pwd
```

```
/users/vlad
```

```
$
```



```
login: vlad
```

```
password: *****
```

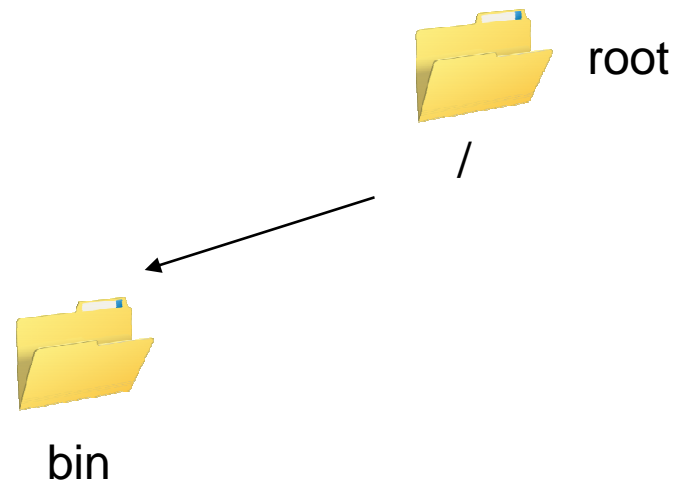
```
$ whoami
```

```
vlad
```

```
$ pwd
```

```
/users/vlad
```

```
$
```



login: vlad

password: \*\*\*\*\*

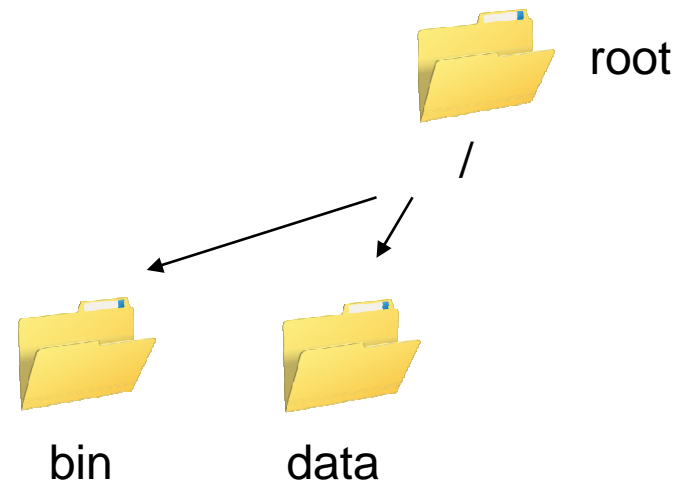
\$ whoami

vlad

\$ pwd

/users/vlad

\$





login: vlad

password: \*\*\*\*\*

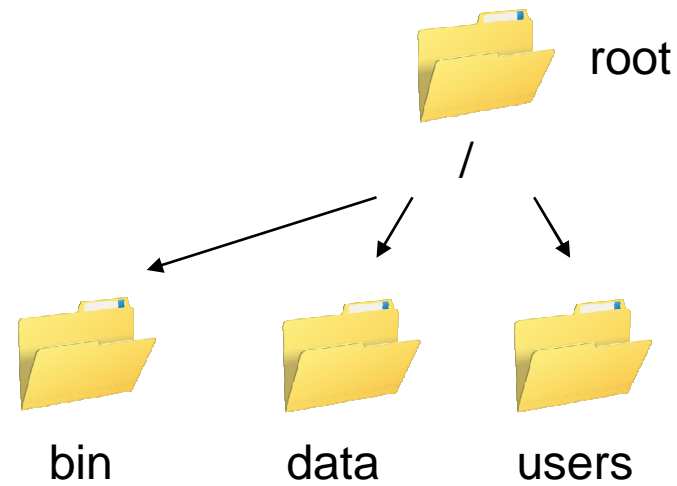
\$ whoami

vlad

\$ pwd

/users/vlad

\$



login: vlad

password: \*\*\*\*\*

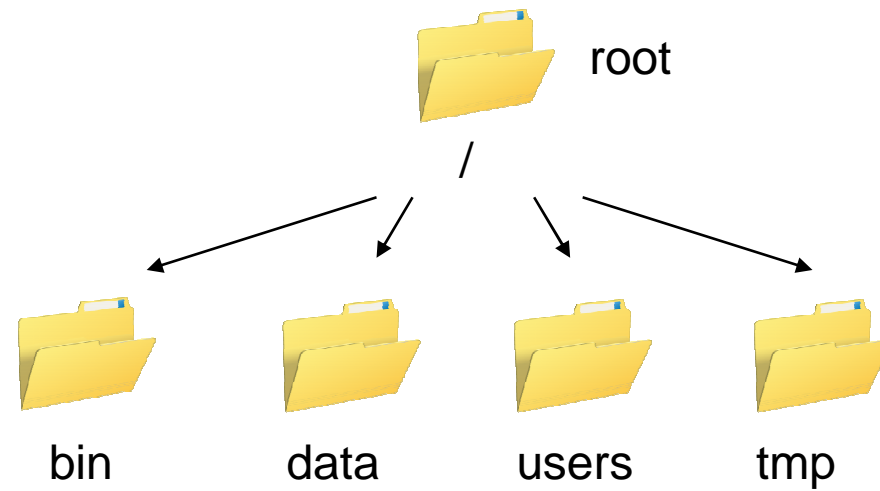
\$ whoami

vlad

\$ pwd

/users/vlad

\$



```
login: vlad
```

```
password: *****
```

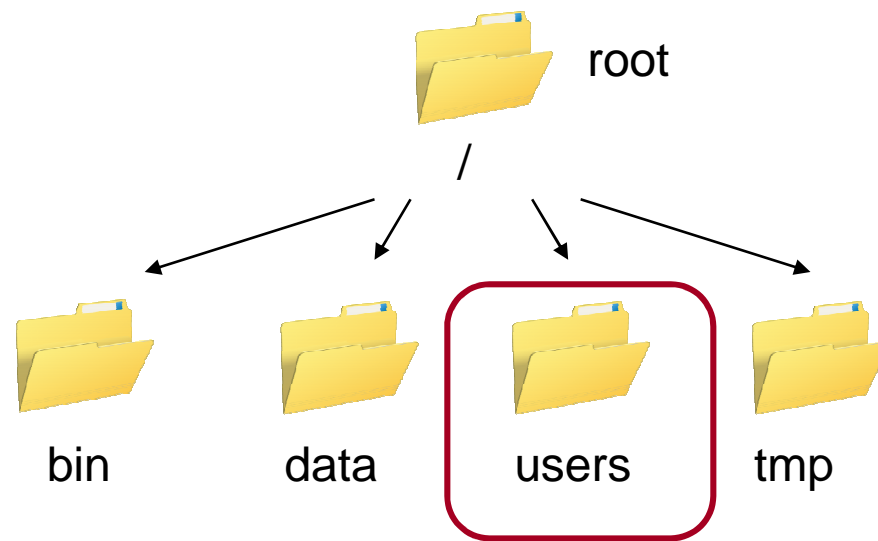
```
$ whoami
```

```
vlad
```

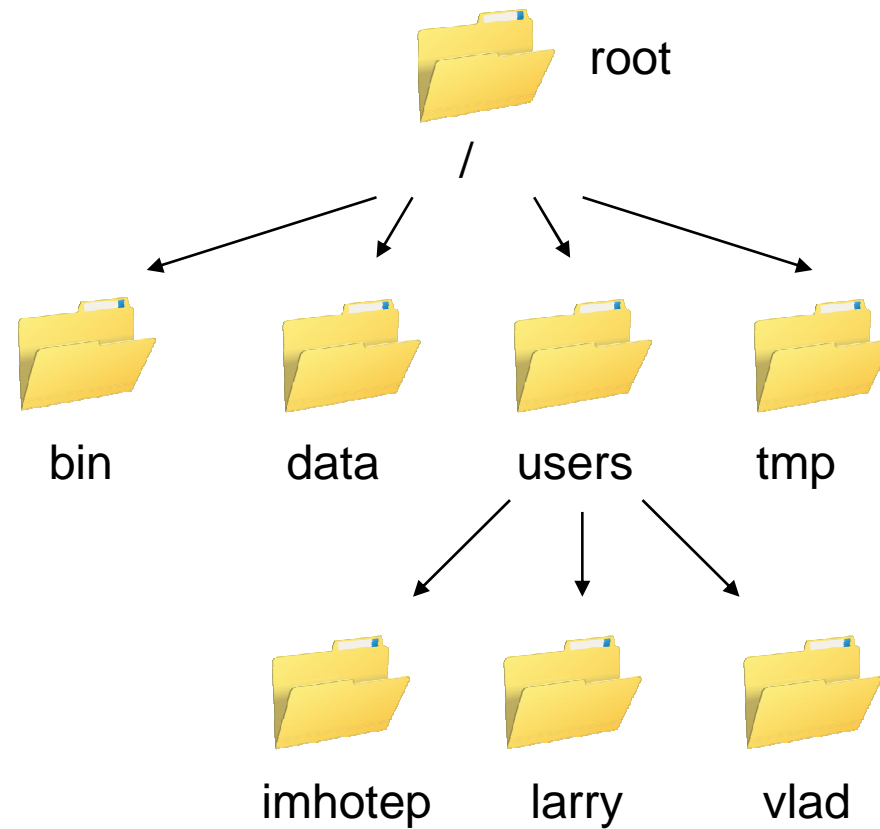
```
$ pwd
```

```
/users/vlad
```

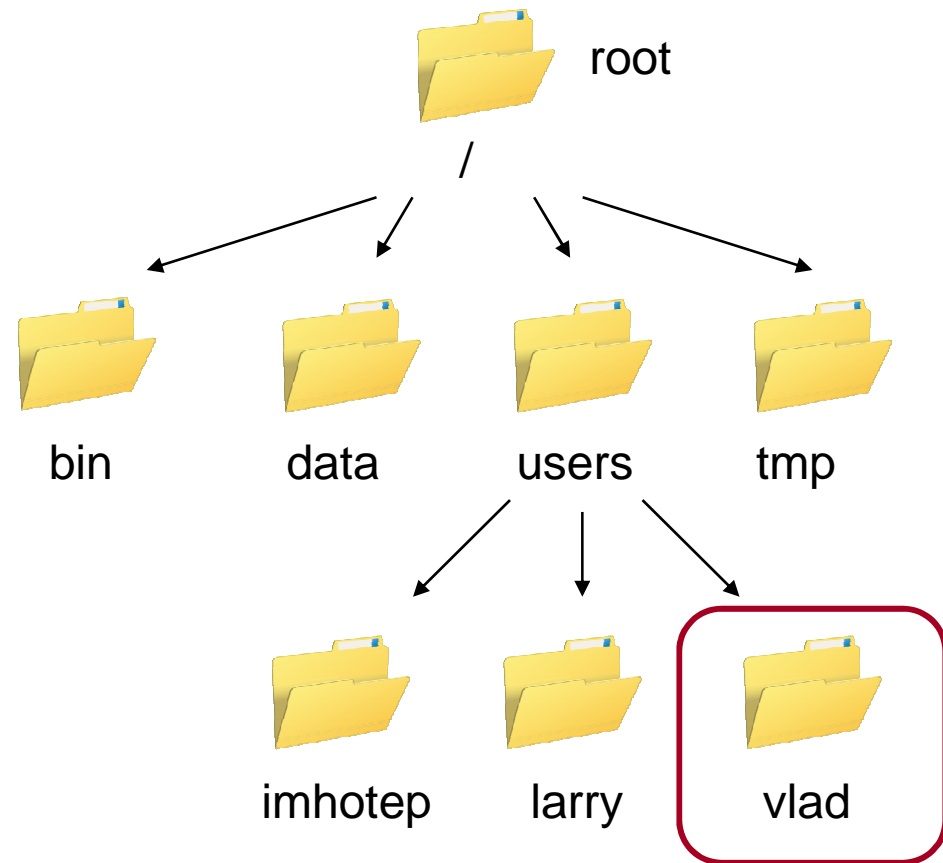
```
$
```



```
login: vlad
password: *****
$ whoami
vlad
$ pwd
/users/vlad
$
```



```
login: vlad
password: *****
$ whoami
vlad
$ pwd
/users/vlad
$
```



login: vlad

password: \*\*\*\*\*

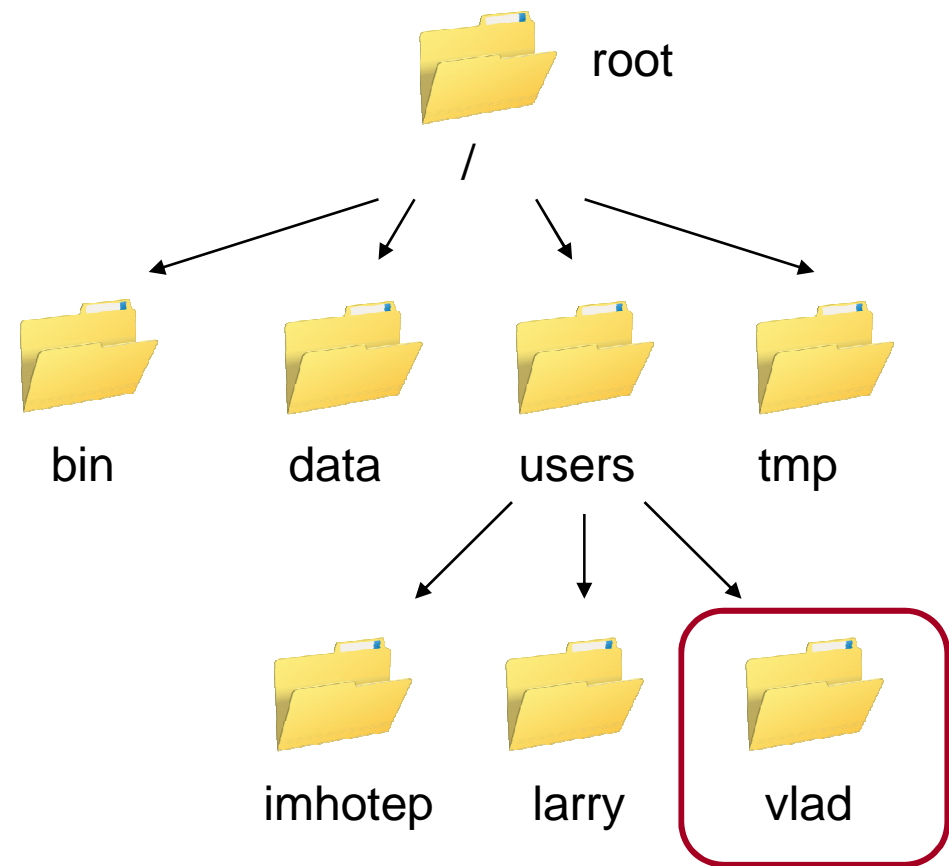
\$ whoami

vlad

\$ pwd

/users/vlad

\$



login: vlad

password: \*\*\*\*\*

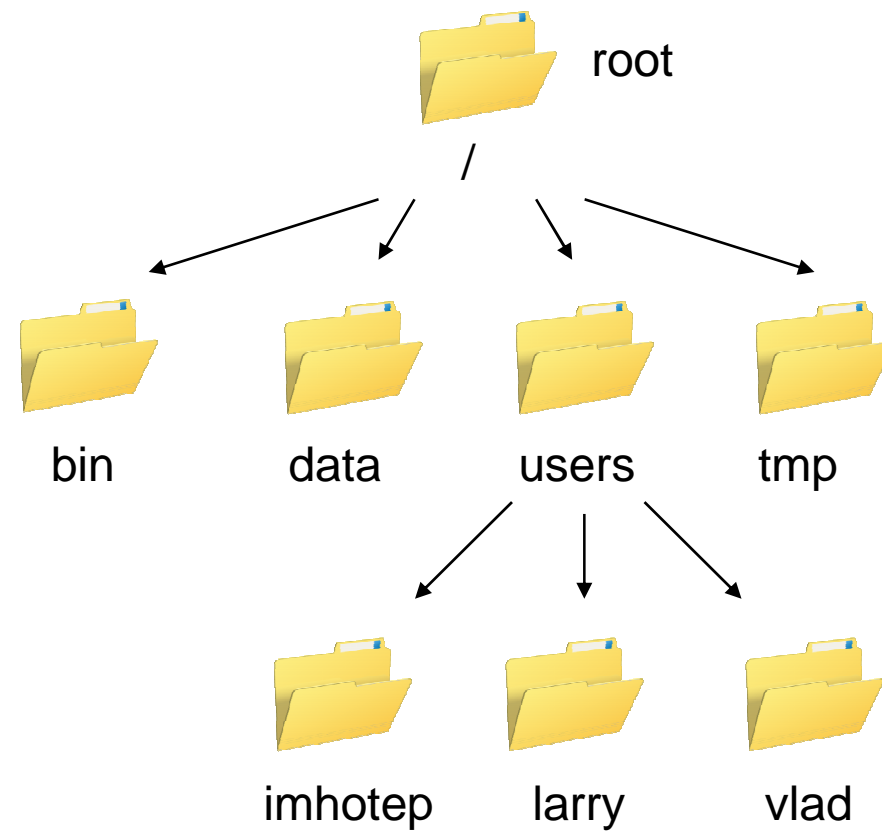
\$ whoami

vlad

\$ pwd

/users/vlad

\$





```
login: vlad
```

```
password: *****
```

```
$ whoami
```

```
vlad
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

← stands for "listing"

```
login: vlad
```

```
password: *****
```

```
$ whoami
```

```
vlad
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```



stands for "listing"  
sadly more memorable than  
most command names

login: vlad

password: \*\*\*\*\*

\$ whoami

*vlad*

\$ pwd

*/users/vlad*

\$ ls

|                  |               |                  |              |
|------------------|---------------|------------------|--------------|
| <i>bin</i>       | <i>data</i>   | <i>mail</i>      | <i>music</i> |
| <i>notes.txt</i> | <i>papers</i> | <i>pizza.cfg</i> | <i>solar</i> |
| <i>solar.pdf</i> | <i>swc</i>    |                  |              |
| \$               |               |                  |              |

```
login: vlad
```

```
password: *****
```

```
$ whoami
```

```
vlad
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls -F
```

an *argument* or *flag* modifying  
the command's behavior



```
bin/          data/      mail/      music/
notes.txt     papers/   pizza.cfg  solar/
solar.pdf     swc/
$
```

```
login: vlad
```

```
password: *****
```

```
$ whoami
```

```
vlad
```

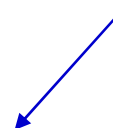
```
$ pwd
```

```
/users/vlad
```

```
$ ls -F
```

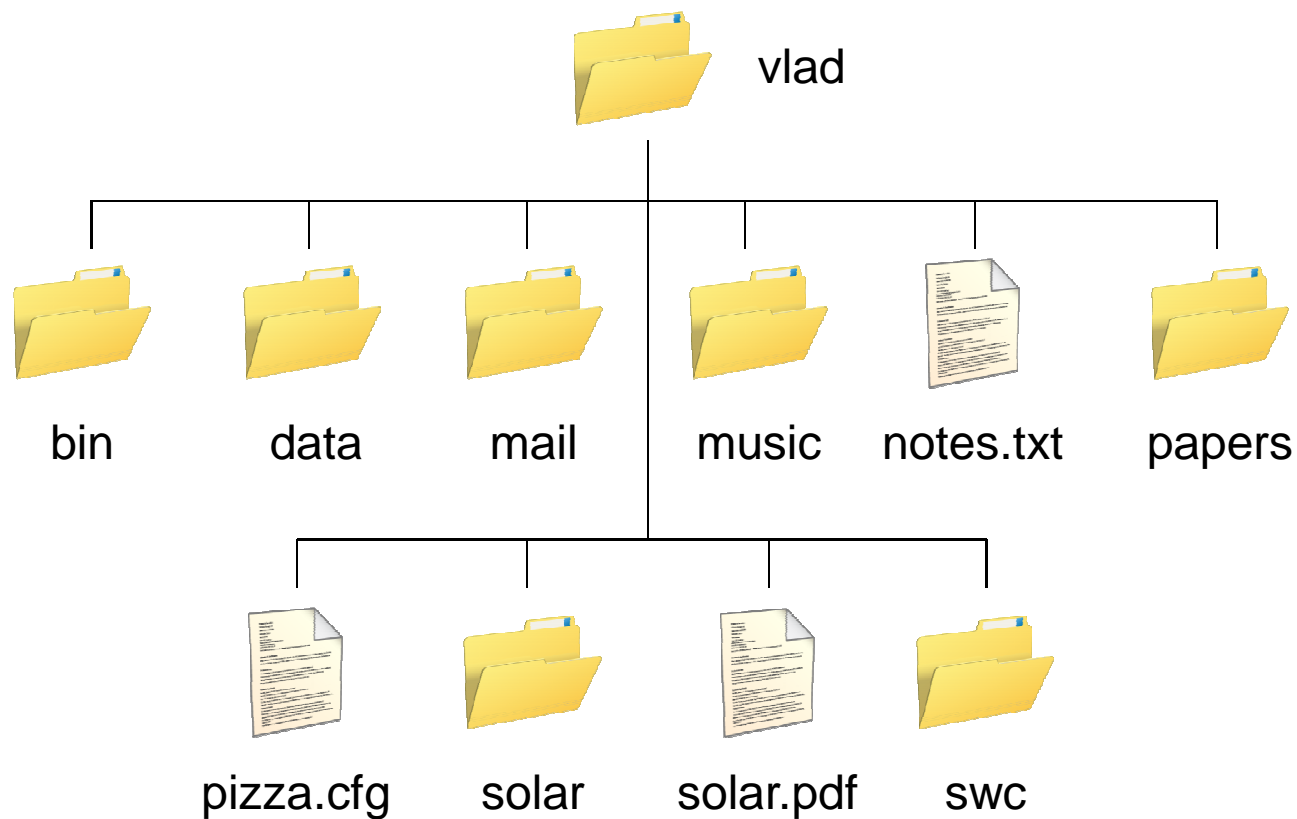
```
bin/      data/      mail/      music/
notes.txt  papers/    pizza.cfg  solar/
solar.pdf  swc/
```

adds a trailing '/' to  
directory names



```
$ ls -F
```

```
bin/          data/      mail/      music/
notes.txt     papers/   pizza.cfg  solar/
solar.pdf     swc/
```



```
$ ls -F
```

```
bin/      data/      mail/      music/  
notes.txt papers/    pizza.cfg  solar/  
solar.pdf swc/
```

By convention, use *filename extension* to indicate file type

```
$ ls -F
```

```
bin/      data/      mail/      music/
notes.txt  papers/    pizza.cfg  solar/
solar.pdf  swc/
```

By convention, use *filename extension* to indicate file type  
.txt for text, .pdf for PDF, .cfg for configuration file, etc.



```
$ ls -F
```

```
bin/      data/      mail/      music/  
notes.txt papers/    pizza.cfg  solar/  
solar.pdf swc/
```

By convention, use *filename extension* to indicate file type  
.txt for text, .pdf for PDF, .cfg for configuration file, etc.

But this is only a convention, not a guarantee

```
$ ls -F data
```

```
$ ls -F data
```

```
amino_acids.txt  elements/  morse.txt  
pdb/             planets.txt sunspot.txt
```

```
$
```

```
$ ls -F data
```

```
amino_acids.txt
```

```
elements/
```

```
morse.txt
```

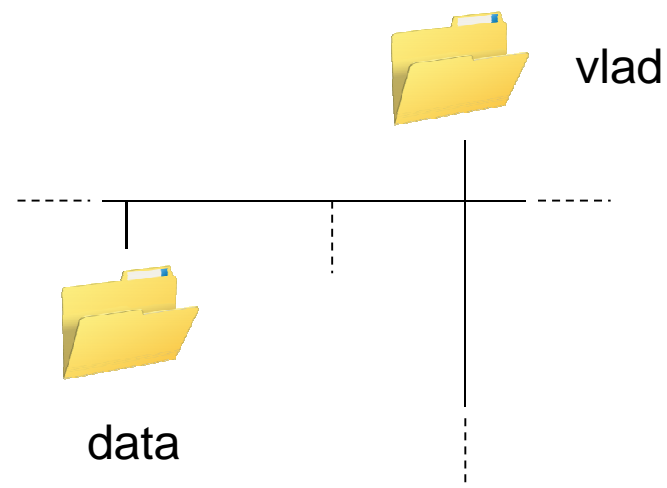
```
pdb/
```

```
planets.txt
```

```
sunspot.txt
```

```
$
```

*a relative path*

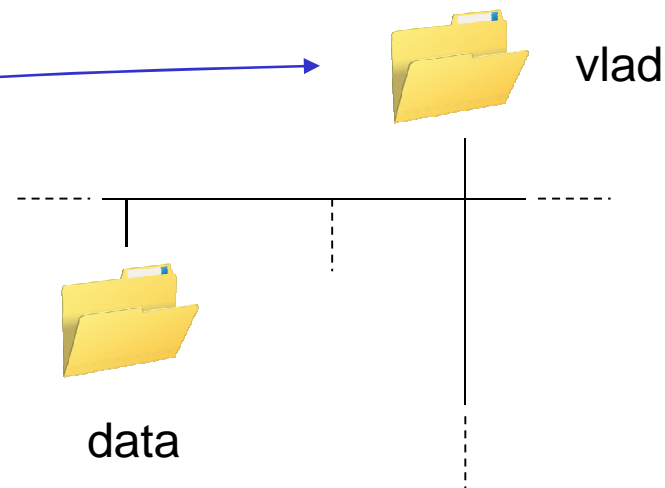


```
$ ls -F data
```

```
amino_acids.txt  elements/      morse.txt
pdb/             planets.txt    sunspot.txt
```

```
$
```

*a relative path*  
relative to  
current working directory



```
$ ls -F /data
```

```
access.log      backup/        hardware.cfg
```

```
network.cfg
```

```
$
```

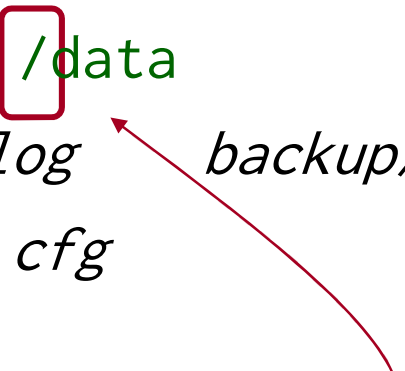
```
$ ls -F /data
```

```
access.log  backup/  hardware.cfg  
network.cfg
```

```
$
```

*an absolute path*

```
$ ls -F /data  
access.log backup/ hardware.cfg  
network.cfg  
$
```



*an absolute path*

leading '/' means "from root"



```
$ ls -F /data
```

```
access.log    backup/      hardware.cfg
```

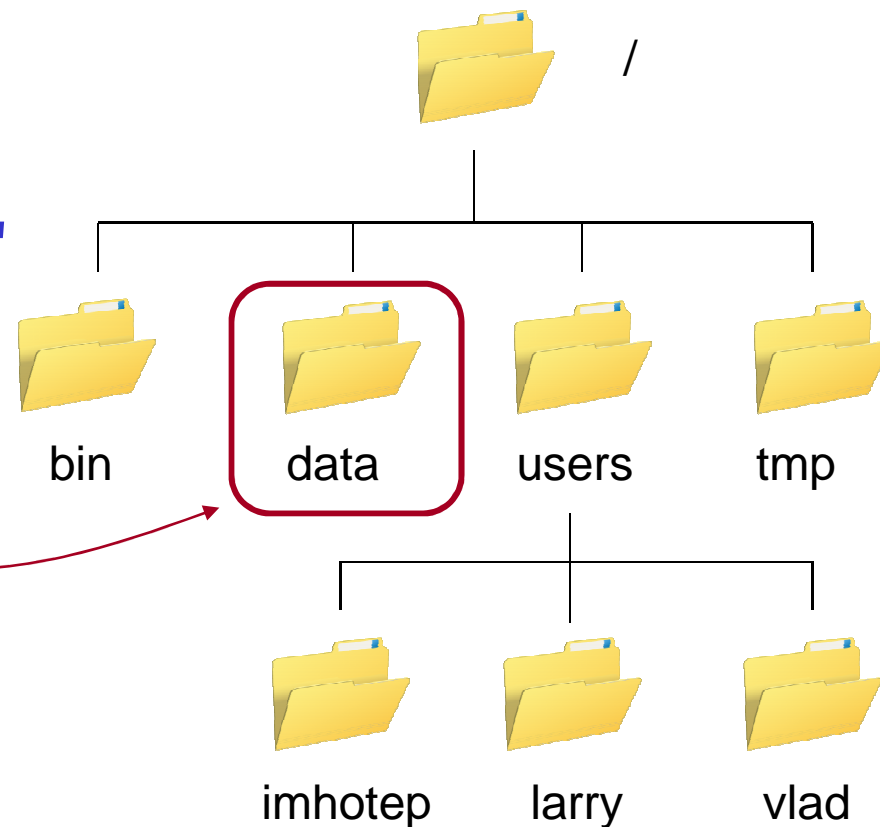
```
network.cfg
```

```
$
```

an *absolute path*

leading '/' means "from root"

so it always refers to  
this directory



```
$ pwd
```

```
/users/vlad
```

```
$
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/         mail/         music/
```

```
notes.txt     papers/       pizza.cfg     solar/
```

```
solar.pdf     swc/
```

```
$
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/
notes.txt     papers/   pizza.cfg  solar/
solar.pdf     swc/
```

```
$ cd data
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/  
notes.txt    papers/   pizza.cfg  solar/  
solar.pdf    swc/
```

```
$ cd data ← change directory
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/  
notes.txt    papers/   pizza.cfg  solar/  
solar.pdf    swc/
```

```
$ cd data
```

← change directory  
actually doesn't change the directory

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/  
notes.txt     papers/   pizza.cfg  solar/  
solar.pdf     swc/
```

```
$ cd data
```

← change directory  
actually doesn't change the directory  
changes the shell's idea of  
which directory we are in

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/
notes.txt     papers/   pizza.cfg  solar/
solar.pdf     swc/
```

```
$ cd data
```

```
$ pwd
```

```
/users/vlad/data
```

```
$
```



```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/
notes.txt     papers/   pizza.cfg  solar/
solar.pdf     swc/
```

```
$ cd data
```

```
$ pwd
```

```
/users/vlad/data
```

```
$ ls
```

```
amino_acids.txt  elements/  morse.txt
pdb/             planets.txt  sunspot.txt
$
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/
notes.txt     papers/   pizza.cfg  solar/
solar.pdf     swc/
```

```
$ cd data
```

```
$ pwd
```

```
/users/vlad/data
```

```
$ ls
```

```
amino_acids.txt  elements/  morse.txt
pdb/             planets.txt sunspot.txt
```

```
$
```

because we're now "in"  
this directory

```
$ pwd
```

```
/users/vlad/data
```

```
$
```

```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

← the directory above the current one

```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

← the directory above the current one  
its *parent directory*

```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

```
$ pwd
```

```
/users/vlad
```

```
$
```

```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/
```

```
notes.txt    papers/   pizza.cfg  solar/
```

```
solar.pdf    swc/
```

```
$
```



```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/          mail/          music/
```

```
notes.txt     papers/        pizza.cfg      solar/
```

```
solar.pdf     swc/
```

```
$ ls -F -a
```

```
./            ../            bin/           data/
```

```
mail/         music/         notes.txt      papers/
```

```
pizza.cfg     solar/         solar.pdf      swc/
```

```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/          mail/          music/
notes.txt     papers/        pizza.cfg      solar/
solar.pdf     swc/
```

"show all"

```
$ ls -F -a
```

```
./           ../           bin/          data/
mail/        music/        notes.txt     papers/
pizza.cfg    solar/        solar.pdf     swc/
```

```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/
notes.txt     papers/   pizza.cfg  solar/
solar.pdf     swc/
```

```
$ ls -F -a
```

```
./          ../          bin/      data/
mail/       music/     notes.txt papers/
pizza.cfg   solar/     solar.pdf swc/
```

parent directory



```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/          mail/          music/
notes.txt     papers/        pizza.cfg      solar/
solar.pdf     swc/
```

```
$ ls -F -a
```

```
./          ../          bin/          data/
mail/        music/       notes.txt     papers/
pizza.cfg    solar/       solar.pdf     swc/
```

parent directory  
/users



```
$ pwd
```

```
/users/vlad/data
```

```
$ cd ..
```

```
$ pwd
```

```
/users/vlad
```

```
$ ls
```

```
bin/          data/      mail/      music/
notes.txt     papers/   pizza.cfg  solar/
solar.pdf     swc/
```

```
$ ls -F -a
```

```
./          ../      bin/      data/
mail/       music/   notes.txt papers/
pizza.cfg   solar/   solar.pdf swc/
```

this directory  
itself

# Things are different on Windows

# Things are different on Windows

`C:\Users\vlad`

# Things are different on Windows

C:\Users\vlad

Drive letter





# Things are different on Windows

`C:\Users\vlad`

Drive letter



Each drive is a separate file system

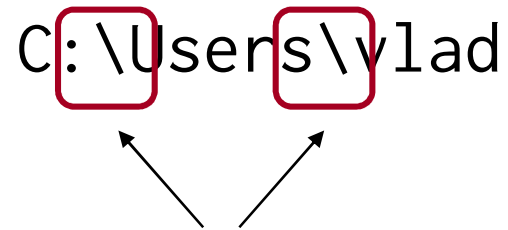
# Things are different on Windows

C:\Users\vlad

Backslash \ as separator

## Things are different on Windows

C:\Users\vlad

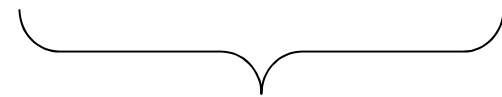
The diagram shows the path 'C:\Users\vlad'. The backslashes are highlighted with red boxes. Two arrows point from the text 'Backslash \ as separator' below to the two backslashes in the path.

Backslash \ as separator

Unix uses \ to escape special characters  
in names like my\ files.txt

# Things are different on Windows

C:\Users\vlad



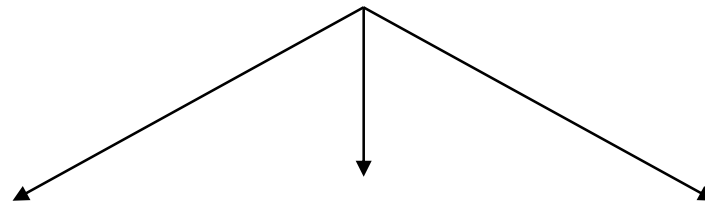
Case insensitive

# Things are different on Windows

C:\Users\vlad



Case insensitive



c:\users\vlad

C:\USERS\VLAD

C:\uSeRs\VlAd

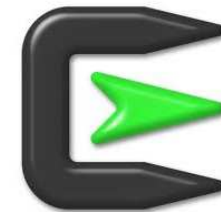
Things are different on Windows

C:\Users\vlad

Cygwin: /cygdrive/c/Users/vlad



Map drive letters to "directories"



Things are different on Windows

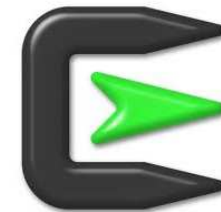
C:\Users\vlad

Cygwin: /cygdrive/c/Users/vlad



Map drive letters to "directories"

And use / instead of \



Things are different on Windows

`C:\Users\vlad`

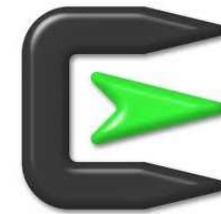
Cygwin: `/cygdrive/c/Users/vlad`



Map drive letters to "directories"

And use / instead of \

But still case insensitive

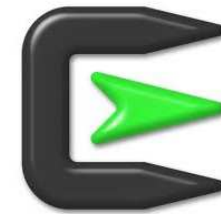




Things are different on Windows

`C:\Users\vlad`

Cygwin: `/cygdrive/c/Users/vlad`



Map drive letters to "directories"

And use / instead of \

But still case insensitive

Can't put `backup.txt` and `Backup.txt` in a directory

|     |                          |
|-----|--------------------------|
| pwd | print working directory  |
| cd  | change working directory |
| ls  | listing                  |
| .   | current directory        |
| ..  | parent directory         |



created by

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