

# How Do I ~~Shoot Myself in the Foot~~ Use the Command Line

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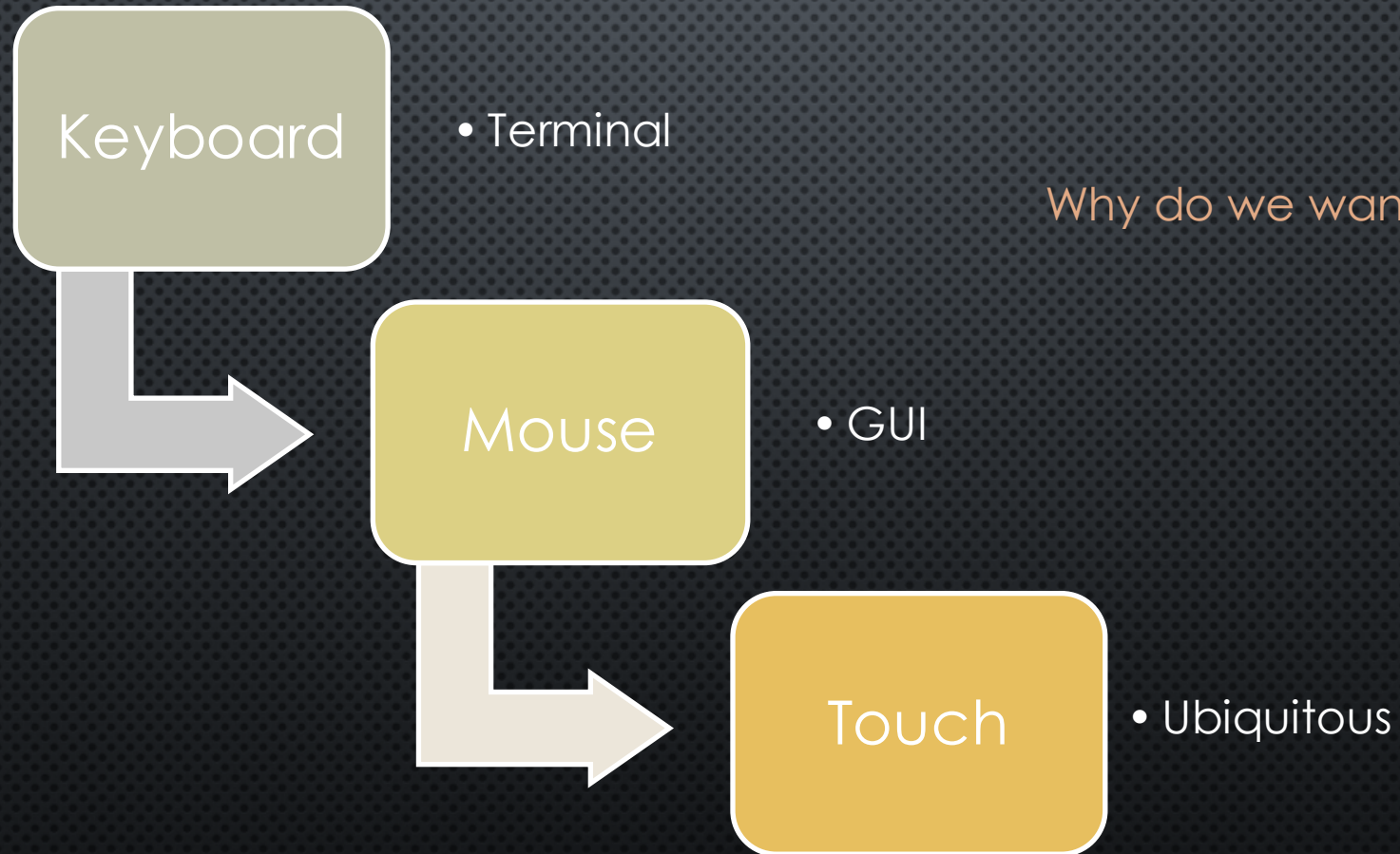
# BACKGROUND – WHO AM I



- 5<sup>TH</sup> YEAR PHD STUDENT, RESEARCH IN HPC, COMPILERS, MACHINE LEARNING
- USING LINUX SINCE 2005, REGULARLY SINCE 2008, FULL-TIME SINCE 2011
- REGULAR EXPRESSIONS ARE MY ACTUAL FAVORITE
- ARCHLINUX, GNOME, BASH, EMACS



# HISTORY OF COMPUTING INTERACTIONS



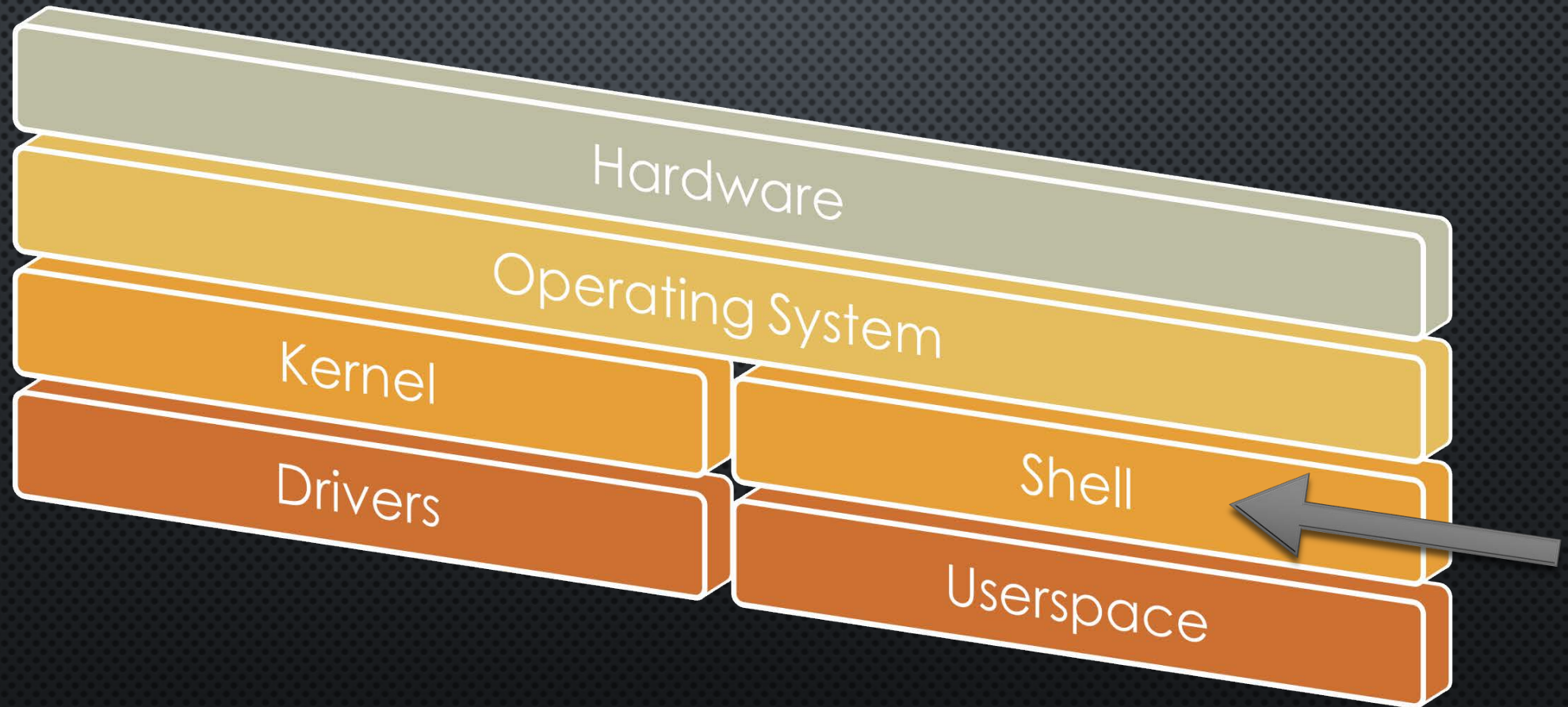


# YOUR HANDS DON'T MOVE





# ANATOMY OF A (MODERN-DAY) \*NIX SYSTEM





# THE SHELL ACTS AS OUR GATEWAY TO THE SYSTEM

- BUT MASTERING A COMMAND-LINE SHELL CAN BE DIFFICULT

```
[wkillian@liz] ~$
```

```
Display all 3655 possibilities? (y or n)
```



# WHAT DO YOU WANT TO LEARN?

- HOW TO...
  - INCREASE **PRODUCTIVITY** WHEN USING A SYSTEM
  - BECOME MORE **SUCCESSFUL** WITH USING COMPUTERS
  - **AUTOMATE** YOUR WORKFLOW
  - BE A **WIZARD**



# BASIC COMMANDS – MOVING AROUND

Command	Arguments	Action
cd	<directory>	Change directory
mv	<src> <dest>	Rename src to dest
mv	<srclist> <dest>	Move srclist to dest
mkdir	[-p] <directory>	[recurse] Create a directory
rm	<list>	Remove list of files
rm	-r <directory>	Recursively delete directory

Important things to know:

- . Current directory
- .. Parent directory
- ~ Home directory
- / Root directory



# BASIC SYNTAX – UNDERSTANDING I/O

- **/DEV/STDIN**
    - STANDARD INPUT
    - ALSO KNOWN AS 0
  - **/DEV/STDOUT**
    - STANDARD OUTPUT
    - ALSO KNOWN AS 1
  - **/DEV/STDERR**
    - STANDARD ERROR
    - ALSO KNOWN AS 2
  - **/DEV/NULL**
    - EMPTY
  - **/DEV/RANDOM**
    - RANDOM SEQUENCE OF BYTES
- >            OUTPUT REDIRECTION
- 2>&1       REDIRECT STDERR TO STDOUT
- <            INPUT REDIRECTION
- >>          OUTPUT APPEND
- p1 | p2     PIPE OUTPUT OF p1 INTO INPUT OF p2



```
/ If I'd known computer science was going \
| to be like this, I'd never have given  |
| up being a rock 'n' roll star.          |
|                                          |
\ -- G. Hirst                             /
```

```

      .      .      .
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i . . ` : i ` i . i . i .
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              ` Y Y ~ ~ ~ Y Y '
                | |       | |
  
```



# HOW DO I KNOW WHAT'S IMPORTANT?

- OR MORE IMPORTANTLY, **WHAT TO USE?** PRACTICE, TRY IT OUT
- HOW DO I KNOW WHAT **SOMETHING DOES?** MAN PAGES
- GNU COREUTILS: [HTTPS://WWW.GNU.ORG/SOFTWARE/COREUTILS/](https://www.gnu.org/software/coreutils/)
- GNU FINDUTILS: [HTTP://WWW.GNU.ORG/SOFTWARE/FINDUTILS/](http://www.gnu.org/software/findutils/)
- GNU DIFFUTILS: [HTTPS://WWW.GNU.ORG/SOFTWARE/DIFFUTILS/](https://www.gnu.org/software/diffutils/)
- BASH BUILTINS: [HTTP://WWW.GNU.ORG/SOFTWARE/BASH/MANUAL/HTML\\_NODE/SHELL-BUILTIN-COMMANDS.HTML#SHELL-BUILTIN-COMMANDS](http://www.gnu.org/software/bash/manual/html_node/Shell-Builtin-Commands.html#Shell-Builtin-Commands)



# BATCH PROCESSING TEXT

- FILTER/MODIFY TEXT, USE **SED**, **AWK**, **TR**, OR **GREP**
- GRAB COLUMNS OF DATA, USE **AWK** OR **CUT**
- MERGING LINES, USE **PASTE**
- SORTING, UNIQUE, SET DIFFERENCES, ETC... USE **SORT**, **COMM**, **UNIQ**



# BATCH PROCESSING FILES

- **FIND** IS YOUR BEST FRIEND
- **XARGS** IS ITS BFF

```
find ~/ -name \*.pdf | xargs cp -t ~/PDFs/
```

FIND ALL PDF FILES IN THE HOME DIRECTORY AND COPY THEM TO ~/PDFs



# PROCESSING TEXT

BUT BEFORE I **KILL** YOU, **MR. BOND...** (ERM, USE MOST TEXT PROCESSING UTILITIES)

I MUST SHOW YOU REGULAR EXPRESSIONS



# REGULAR EXPRESSIONS

`^\(banana.*\)\\{2,\\}orange$`

two or more 'banana' followed by 'orange'

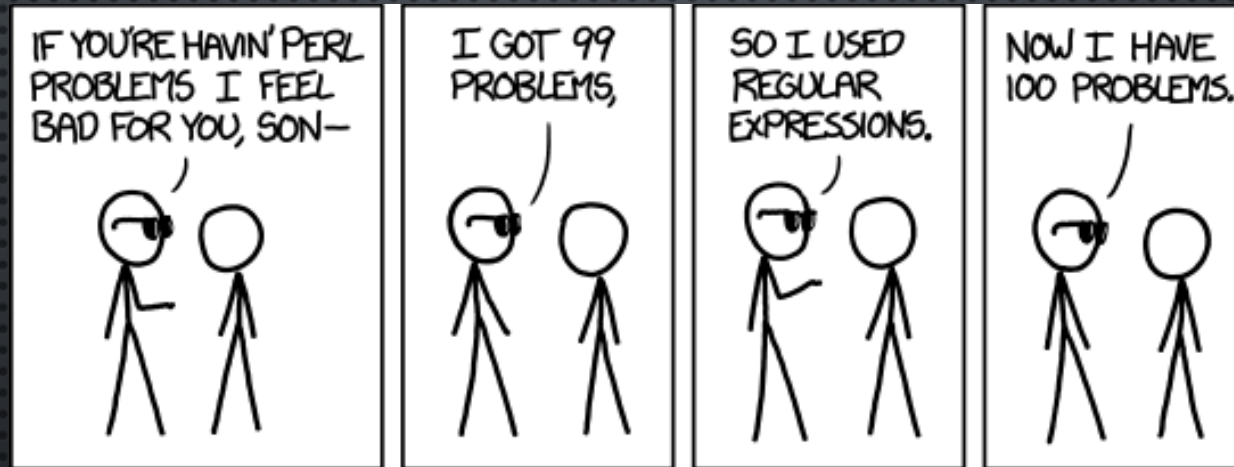
<code>^</code>	begin of line
<code>\( \)</code>	group
<code>.</code>	any character
<code>*</code>	zero or more
<code>\\{[m],[n]\\}</code>	minimal m, maximum n
<code>\$</code>	end of line
<code>[a-z]</code>	character group (a-z) ; [aeiou] vowels ; [^aeiou] no vowels





REGULAR EXPRESSIONS CAN BE **AWESOME**





REGULAR EXPRESSIONS CAN BE **HARD**



Sample Data: <http://www.udel.edu/002771>

# DEMO TIME

THIS PART IS INTERACTIVE – I CAN GO OVER ANYTHING