

Data Science – Basics

Lecture 02 – Shell

Fabian Sinz

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Institute for Computer Science – Campus Institute for Data Science (CIDAS)

```

mars@marsmain ~$ pwd
/home/mars
mars@marsmain ~$ cd /usr/portage/app-shells/bash
mars@marsmain /usr/portage/app-shells/bash$ ls -al
total 130
drwxr-xr-x 3 portage portage 1024 Jul 25 10:06 .
drwxr-xr-x 33 portage portage 1024 Aug 7 22:39 ..
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mars@marsmain /usr/portage/app-shells/bash$ cat metadata.xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE pkgmetadata SYSTEM "http://www.gentoo.org/dtd/metadata.dtd">
<pkgmetadata>
  <herd>base-system</herd>
  <use>
    <flag name='bashlogger'>Log ALL commands typed into bash; should ONLY be
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  </use>
</pkgmetadata>
mars@marsmain /usr/portage/app-shells/bash$ sudo /etc/init.d/bluetooth status
Password:
* status: started
mars@marsmain /usr/portage/app-shells/bash$ ping -q -c1 en.wikipedia.org
PING rr.esams.wikimedia.org (91.198.174.2) 56(84) bytes of data.

--- rr.esams.wikimedia.org ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 2ms
rtt min/avg/max/mdev = 49.820/49.820/49.820/0.800 ms
mars@marsmain /usr/portage/app-shells/bash$ grep -i /dev/sda /etc/fstab | cut --fields=
/dev/sda1 /boot
/dev/sda2 none
/dev/sda3 /
mars@marsmain /usr/portage/app-shells/bash$ date
Sat Aug 8 02:42:24 MSD 2009
mars@marsmain /usr/portage/app-shells/bash$ lsmod
Module Size Used by
rndis_wlan 23424 0
rndis_host 8696 1 rndis_wlan
cdc_ether 5672 1 rndis_host
usbnet 18688 3 rndis_wlan,rndis_host,cdc_ether
parport_pc 38424 0
fglrx 2388128 20
parport 39648 1 parport_pc
itcd_wdt 12272 0
i2c_i801 9360 0
mars@marsmain /usr/portage/app-shells/bash$
  
```

Data Exploration with Bash (Unix Shell)

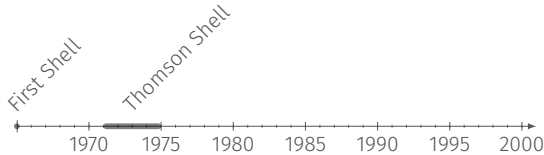
- A **Unix shell** is a command line interpreter that provides an interface to Unix-like operating systems (Linux, MacOS)
- Windows now provides a similar tool with the PowerShell
- It can be used as an interactive command language
- It can be used as a scripting language

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Module Size Used by
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usbnet 18688 3 rndis_wlan,rndis_host,cdc_ether
perport_pc 38424 0
lpc 2388128 20

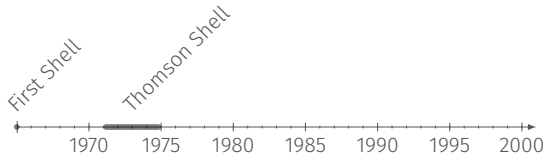
```



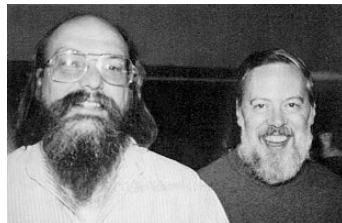
- First first command-line user interface shell developed by Glenda Schroeder at MIT
- Modelled after the RUNCOM program by Louis Pouzin
- For the Multics operating system.



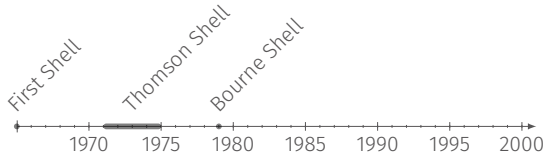
[<http://www.tech-heroines.org/2017/09/glenda-schroeder.html>]



- First Unix shell developed by Ken Thompson for Unix 1-6 at Bell labs
- He also invented B, the direct predecessor of C
- He worked at Google where he co-developed the Go programming language.
- He worked on regular expressions
- He provided the definition of UTF-8 encoding
- He won the Turing award (“Nobel prize” of computer science)



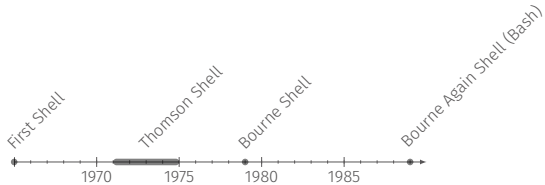
[https://en.wikipedia.org/wiki/Ken_Thompson]



- Developed by Stephen Bourne for Unix 7 at Bell labs
- Introduced basic features common to all other shells
- Bash is based on the Bourne shell



[https://en.wikipedia.org/wiki/Stephen_R._Bourne]



- Developed by Brian Fox for the GNU Project as a free replacement for the Bourne shell
- Is used as default login shell for most Linux distributions
- Used in macOS until Catalina (now `zsh` is used)



[[https://en.wikipedia.org/wiki/Brian_Fox_\(computer_programmer\)](https://en.wikipedia.org/wiki/Brian_Fox_(computer_programmer)))]

Why use a shell?

- Gives you immediate access to your operating system
- Good to explore and preprocess data
- Good for automating simple jobs and immediate interactions
- Faster than clicking
- Can be used remotely (on servers and clusters)
- Has many powerful and fast tools that allow you to automate many jobs
- Has a large online community

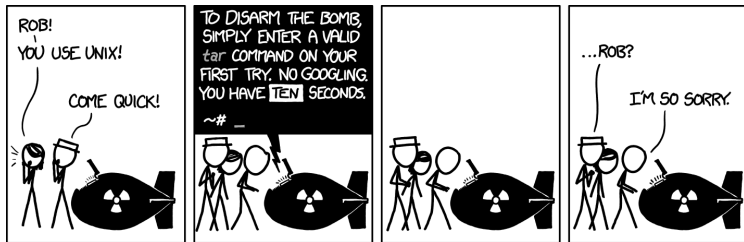
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/home/mars
mar$mar$main " " $ cd /usr/portage/app-shells/bash
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total 136
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lpr 238128 2b
parport 39648 1 parport_pc
ltd0_wdt 12272 0
ltd0_i801 9380 0
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```


- Use TAB (key at the left side of your keyboard) for completing commands.
- The completion is pretty smart
- This saves typing time and effort to remember files/commands exactly
- You can make Unix/Linux users **really** nervous by not using it.

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parport_pc 38424 0
lpr 2388128 20
parport 39648 1 parport_pc
ltdc_wdt 12272 0
ltdc_l801 9380 0
mar$mar$main /usr/portage/app-shells/bash$
```



[<https://xkcd.com/1168/>]

- It shows you a few examples and how to get around
- Introduction to the most important commands
- It is not a comprehensive treatment of all commands and capabilities.

To the notebook
(fire up your shells)

- htop
- watch date
- CTRL-C, CTRL-D, CTRL-Z + bg

- `tmux`
- Split pane: `C-b %`, `C-b left/right`
- New window: `C-b c`, `C-b p`, `C-b n`, `C-b <number>`
- Detach: `C-b d`
- Attach: `tmux ls`, `tmux attach -t 0`

[<https://www.hamvocke.com/blog/a-quick-and-easy-guide-to-tmux/>]

That's it.
Questions?