R for SysAdmins

Rigorous System Administration

Presenter Bio

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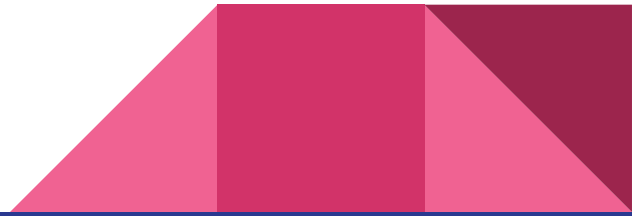
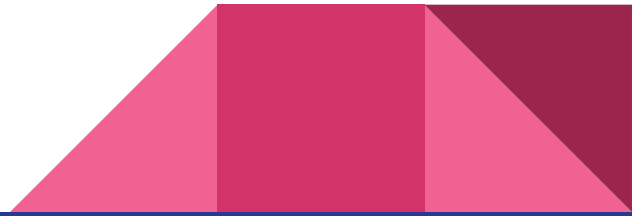
(My first Flux presentation almost 15 years ago was on Mathematics Applications for Linux and covered R, MuPad, Octave and similar tools.)



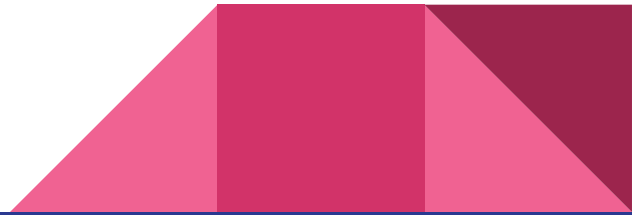
R

- Statistics language based on S
- Built for working with data (CSV, XLSX, HTML tables, etc.)
- Not a replacement for traditional scripting but "right tool" for many jobs
- GNU Licensed (Available with a "yum install R")



Long Live the SysAdmin

- Once were SysOps, Operators, BOFHs
- Roles included email administration, new user creation, filesystem maintenance
- Now SysAdmin may be responsible for scripting, full development, application management (Oracle, MySQL, Email), Security, Infrastructure (VMWare, OpenStack, AWS), growth projections, budgets, etc..



Rigorous System Administration

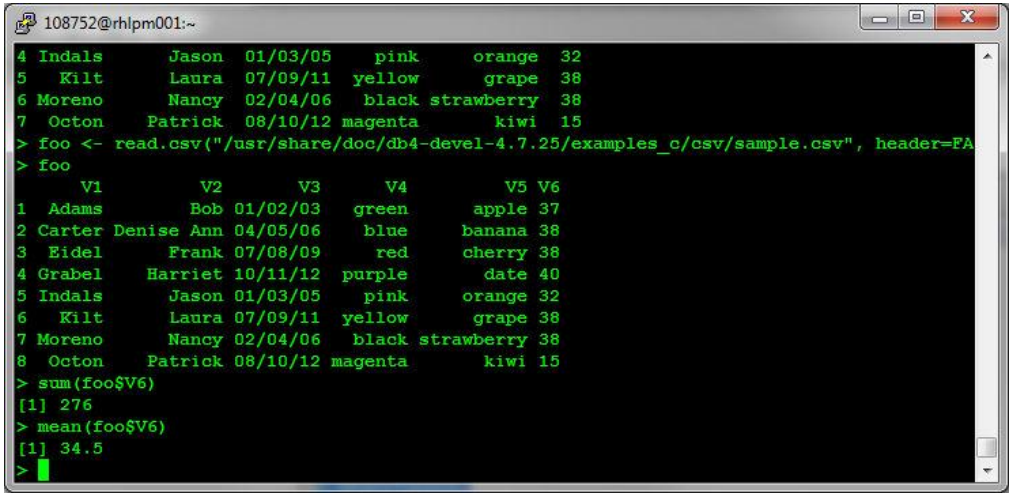
- "Proceed from knowledge."
- Years of experience can lead to "rules of thumb"
- "Rule of thumb" leads to sub-optimization and false results
- False results lead to downtime.
- Downtime leads to suffering (midnight calls).

Why R?

- Easy manipulation of data
- Scriptable, automatable
- Easy metrics (Bayesian, outliers, anomaly detection)
- Easy input/output from/to PHB-friendly formats (Excel, PDF reports)
- Language translates well to Hadoop, GPU computing

CSV, fixed column, etc.

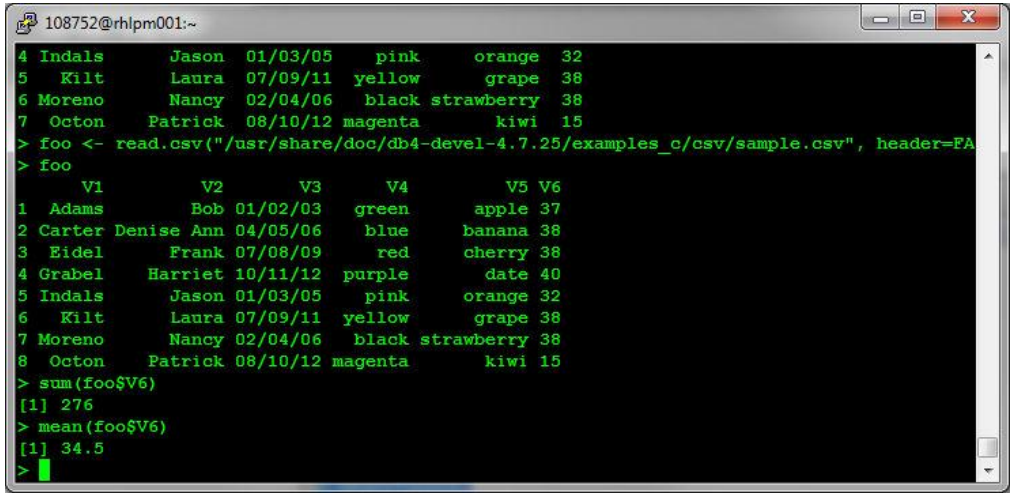
sum(foo$V6)



CSV, fixed column, etc.

But I can do that quickly in awk!!

awk '{ SUM += $6} END { print SUM}'



Excel? No problem.

```
library(xlsx)
input <- read.xlsx("myfile.xlsx"), sheet=1, header=TRUE)


output <- select(aws_volumes, VolumeId, Size, VolumeType, CreateTime)
write.xlsx(output, file = "awsVolumes.xlsx")
```

JSON? Of course...

Example from the RJSON package

```
sample_json <- '
{
"breakfast" : [ "milk", "fruit loops", "juice" ],
"lunch" : [ "left over sushi" ]
}
'

parser <- newJSONParser()

parser$addData( sample_json )
food <- parser$getObject()
print( food )

#This is equivalent to using FromJSON( sample_json )
#However, sample_json can be split into several parts:
```

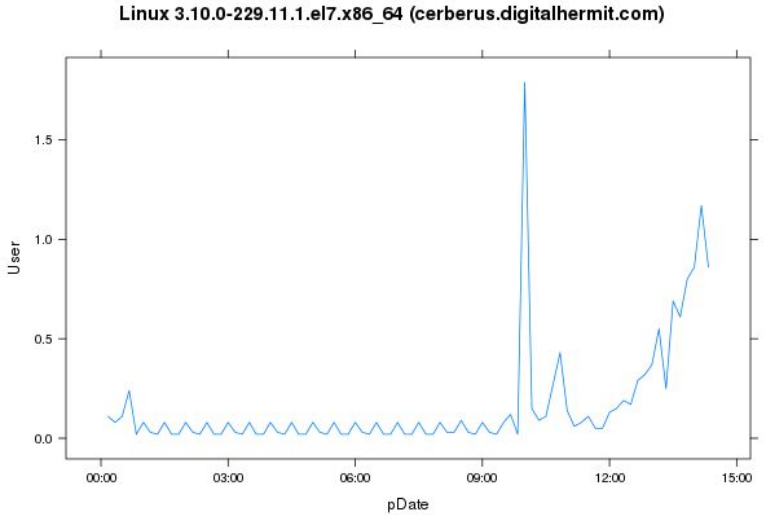
Dealing with sysstat output

sar output is messy...

```
[108752@rhldakl1069 R]$ sar

Linux 2.6.32-504.23.4.el6.x86_64 (rhldakl1069.na.rccl.com)      09/15/2015      _x86_64_(2
CPU)

12:00:01 AM     CPU      %user     %nice   %system   %iowait    %steal     %idle

12:10:02 AM     all       2.23      0.00      0.61      0.10      0.00     97.06
```

Dealing with sysstat output

sar to graph in fifteen lines of code



Dealing with sysstat output

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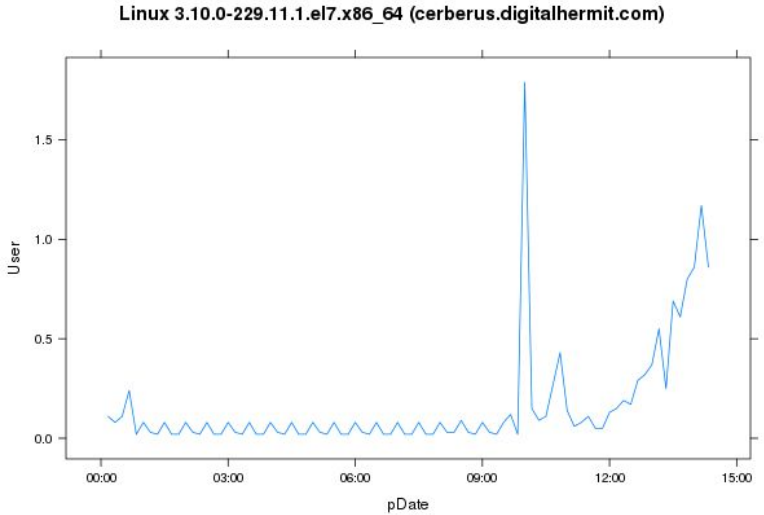


Proceed from Data

Scene in Pitch Black...

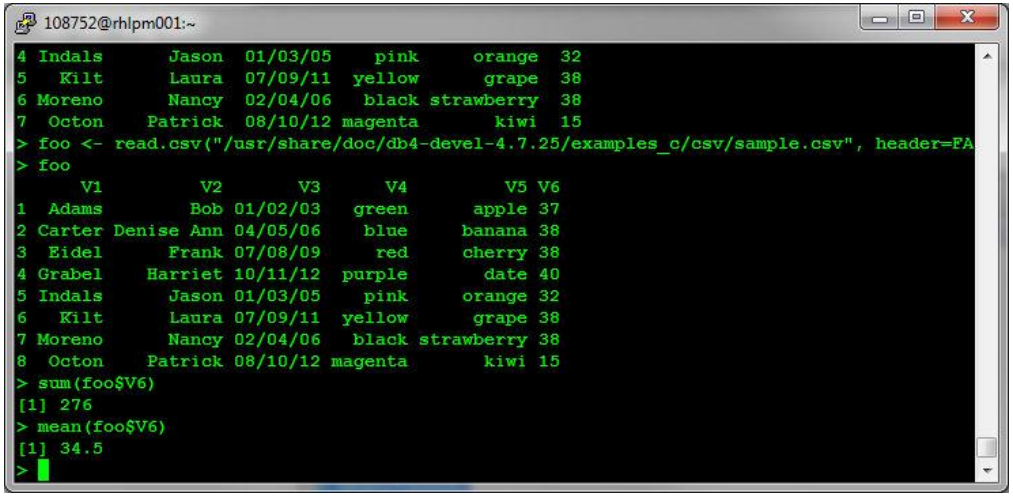
Proceed from Data

Without rigorous analysis, data can deceive…

- Experienced engineers may fall for deceptive data (cost/payoff matrix favors this approach)
- Why? Code can be hard.
- R reduces the cost of analysis.

CSV, fixed column, etc.

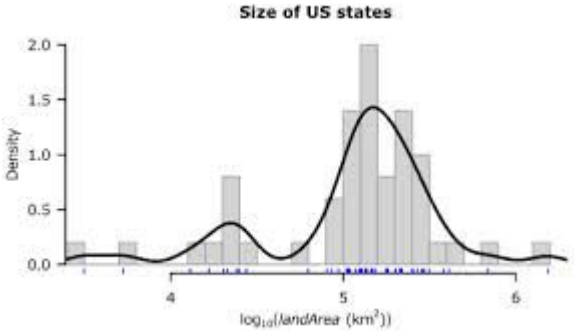
sum(foo$V6)



Proceed from Data

Quantile(and histograms) in a single line…

Here, using it to determine sizings for a template based on actual data.




```
print (quantile(mydata[,"size"]))
## END

The above will quartile the inputs to return:

    0%    25%    50%    75%   100%
   490   2024   7872  15951 123058
```

The OODA Loop

Analytics is a strategy and a tactic.

- How large should we size our virtual machine images?
- How much growth do we expect in the next year?
- What are the most common causes of outages?

Resources

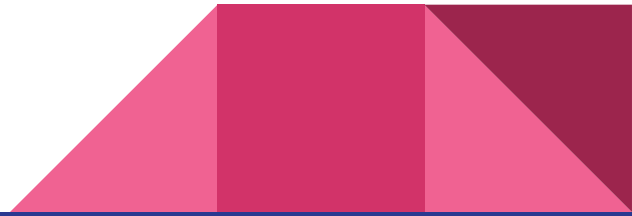
- https://cran.r-project.org/
- https://www.rstudio.com/
- https://www.coursera.org/specializations/jhudatascience
- https://github.com/twitter/AnomalyDetection
- http://www.rdatamining.com/big-data/r-hadoop-setup-guide
- http://www.r-tutor.com/gpu-computing
- https://cran.r-project.org/web/packages/rjson/

Resources

This deck...

Try It Yourself

- http://rhldakll069.na.rccl.com:8787/
- Install R/Rstudio on your laptop



Questions?