Writing robust Shell scripts

gild

WHY SHOULD I CARE?

Because you need something quick, and oh yes let's write a shell script

And then end up with a flying spaghetti monster

> I'll write my new amazing project in bash -- said no one ever

SRSLY?

2001: ITUNES "INSTALLER"

A *small* shell script (wink wink) that removes the old version

```
rm -rf $2/Applications/iTunes.app 2
```

`$2` is the name of the drive where iTunes is being installed on.

... but is not quoted, so if the drive contains a space in the name, this resulted in deleting drives with similar names. i.e

```
# installing on "Disk 1"
rm -rf Disk 1/Applications/iTunes.app 2
# figuring out what happened to the disk named "Disk" is left as an exercise
```

2011: ONE SPACE TOO MUCH

The author of bumblebee was trying to cleanup a bunch of stuff

```
rm -rf /usr /lib/nvidia-current/xorg/xorg
```

Whoops!

gild

2015: STEAM CLUSTERFUCK

```
STEAMROOT="$(cd "${0%/*}" && echo $PWD)"
# ...

reset_steam() {
# ...
rm -rf "$STEAMROOT/"*
# ...
}
```

When `steam.sh` is invoked with `--reset` it tries to remove the `~/.steam` directory.

Except when launched with `bash steam.sh` so that `$0` is `steam.sh`, cd fails, `$STEAMROOT` is empty and the `rm` .. well.

gild

RHEL: JUST RESTART SQUID!

```
restart() {
  stop
  RETVAL=$?
  if [ $RETVAL -eq 0 ] ; then
  rm -rf $SQUID_PIDFILE_DIR/*
  start
  ...
}
```

At this point should be clear what happened sometimes to `$SQUID_PIDFILE_DIR`

... and which user init scripts run as :-)

OUTLINE

- sane coding style (it **helps a lot**)
- `set -e`
- `set -u`
- `set -o pipefail`
- be careful with `$?`
- shellcheck

CODING STYLE (YMMV)

- no tabs, use 2 spaces. Do not leave trailing spaces
- Variables:
  - `$THIS_IS_A_GLOBAL` or exported variable
  - `$_this_is_another_var`: the `_` at the beginning makes the code more readable by separating the dollar sign
  - use `local` for var declared inside functions
- function names with underscores as in `this_is_a_fun() {}`

CODING STYLE (CONT.)

Pipes should be multiline

```
find "${_keyspace}" -name "${SNAPNAME}" -print0 | \
  xargs -r0 sh -c 'find "$@" -type f -print0' subfind | \
  tar -c -a -O --null -T - 2>/dev/null | \
  /usr/local/bin/gof3r put -b "${S3BUCKET}" -k "${S3_KS_PATH}" 2>&1
```

.. even if some people prefer to have the pipe at the beginning of the line

SET -E (A.K.A. NAZI MODE)

`set -e` simply terminates the script with exit code = 1 if:

> "if a simple command (see SHELL GRAMMAR above) exits with a non-zero status. The shell does not exit if the command that fails is part of the command list immediately following a while or until keyword, part of the test in a if statement, part of an && or ll list, or if the command's return value is being inverted via !"

WAT?

```
#!/bin/bash
set -e
echo 'ciao' | grep -q 'hi'
echo 'you will not see this message'
```

```
[giacomo:~] $ bash test.sh
[giacomo:~] $ echo $?
1
```

gild

SET -E (CONT.)

```
#!/bin/bash
set -e
echo "ciao" | grep -q "hi" || echo "not found"
echo 'this *will* be printed'
```

```
[giacomo:~] $ bash test.sh
not found
this *will* be printed
```

SET -E (CONT.)

`set -e` is tricky, has a lot of quirks and is generally speaking a PITA

but is really helpful to avoid unexpected behaviours.

Just be sure to `echo` all the things ***before*** executing as any failing command can quit the script

```
#!/bin/bash
set -e

echo "trying this and that"
my_command arg1 arg2
echo "Everybody stand back, I'm gonna try some science"
my_other_command
# you probably get it
```

You can always temporarly disable it using `set +e` -- just don't abuse!

SET -U

Always use `set -u`

Makes the script exit with error if a variable is used but undefined.

Don't overtrust, it can't help when a variable is declared and set to an empty variable

```
#!/bin/bash
set -u

echo "Hi $1"
```

```
[giacomo:~] $ bash test.sh gild
Hi gild
[giacomo:~] $ bash test.sh
test.sh: line 5: $1: unbound variable
```

gild

SET -U (CONT.)

Use defaults or test for args (for `"$@"`)

```
#!/bin/bash
set -e
set -u
_from_env=${MY_ENV_VAR:-default_value}
_target="gild"
[ $# -eq 1 ] && _target="$1"
echo "From env: $_from_env , target: $_target"
```

```
[giacomo:~] $ bash test.sh
From env: default_value , target: gild
[giacomo:~] $ bash test.sh you
From env: default_value , target: you
[giacomo:~] $ MY_ENV_VAR="env is cool" bash test.sh you
From env: env is cool , target: you
```

SET -O PIPEFAIL

The return code of a pipe is the return code of the last command

```
[giacomo:~] $ echo "hi" | grep -q "ciao" | ls >/dev/null
[giacomo:~] $ echo $?
0
```

`grep -q` fails, but `ls` does not, so the pipe exit with success

Adding `set -o pipefail` to the script will make the pipe fail if any of the command fails

```
#!/bin/bash
set -o pipefail
set -e
echo "hi" | grep -q "ciao" | ls >/dev/null
echo "you won't see this line"
```

gild.

SET -O PIPEFAIL (CONT.)

You can get the various exit codes looking them up in the `$PIPESTATUS` array.

```
echo test | fail_command | something_else
local _ret_pipe=( ${PIPESTATUS[@]} )
# from here, `PIPESTATUS` is not available anymore
```

RETURN CODES AND $?

Keep in mind that `$?` ***must*** be accessed right after the command itself (like `$PIPESTATUS`).

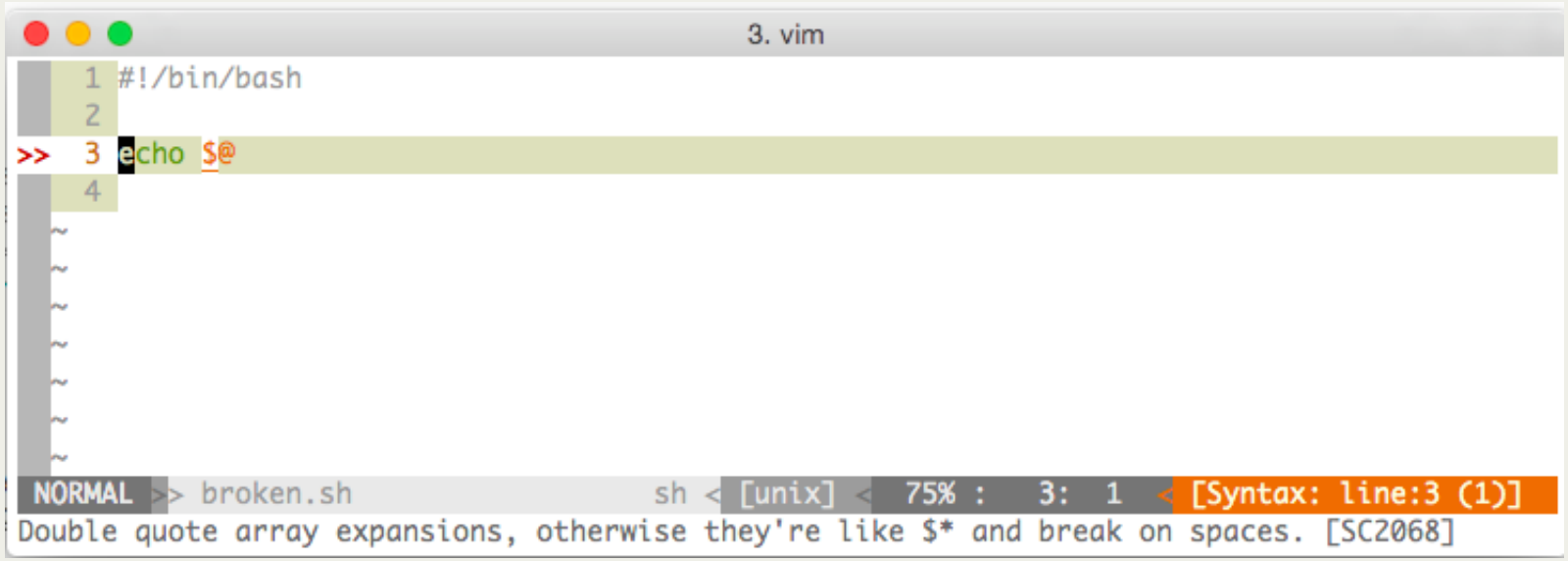
Also, when using `set -e` the script will fail before that :)

```
set +e
which mongo &>/dev/null
if [ $? -ne 0 ]; then
  echo "Installing mongo tools"
  sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv 7F0CEB10
  echo 'deb http://downloads-distro.mongodb.org/repo/ubuntu-upstart dist 10gen' | sudo te
  sudo apt-get update
  sudo apt-get install -y mongodb-org-tools=${mongodb_tools_version} mongodb-org-shell=$
fi
set -e
```

Saving `$?` to a local variable for later uses is a good pratice as well

SHELLCHECK

Finally, install shellcheck in your editor, this will check for common mistakes.



THAT'S ALL!