Programming in Linux Environment 2017-B
Assignment 2: Advanced scripting

Deadline: Wednesday, 11/04/2018

This assignment should be submitted as a single *.tar.gz* file. TLCL and ULSAH books from the syllabus are a good help. The assignment should be submitted in groups of 4 students. Names and IDs of the students in the group must be written in a separate README file in the archive, and *also* listed in the submission comment in Moodle. The files in the archive must have correct permissions (e.g., the executable bits).

The scripts that you write should be well-commented, and take advantage of functions for modularity. When using helper scripts, make sure that they can be invoked properly even when the current directory is different from their location (without hardcoding absolute paths). All variable references should be quoted unless an unquoted behavior is necessary.

Task 1

Rewrite *dict-lookup* and *dict-update* from Task 2 of Assignment 1 to use *getopt* command-line arguments parser.[1] The script should support short and long options, print a descriptive synopsis on *-h / --help* parameter, and report errors on incorrect options.

Filename and other parameters containing spaces and other special characters should be properly supported. Extra arguments should be reported as errors.

Note that the DICTIONARY environment variable still needs to be supported, as with the previous assignment.

[1] See examples in the following tutorial: http://www.tutorialspoint.com/unix_commands/getopt.htm

Task 2

Register a free domain at dot.tk (use provided DNS servers, and set the domain addresses to 127.0.0.1). Create a CloudFlare account, and add the new domain as a free website (note that it may take up to an hour for the new domain to be visible to CloudFlare via .tk TLD DNS). Change the DNS nameservers of your domain to those of CloudFlare, as suggested.

Congratulations! You can now manage your domain's DoS-resistant DNS via CloudFlare website and API[2].

See the "Getting started" section of CloudFlare API documentation for details of using *curl* to send API queries. Use an appropriate query to test extracting the result containing zone ID that matches your new domain; make sure to specify the domain name in the query.

Install *jq* JSON processor using *sudo apt-get install*, and pipe the previous result to extract the zone ID (without quotes) via *".result[0].id"* filter or similar. This zone ID can be now used to list DNS records, update them, etc.

Write a *cf-dns* command-line tool to handle DNS entries in CloudFlare. Script parameters:

- cf-dns -h|--help
- cf-dns [-q|--quiet] -c|--credentials <email>:<apikey> -g|--get <subdomain> -t|--type <type>
- cf-dns [-q|--quiet] -c|--credentials <email>:<apikey> -u|--update <subdomain>
  -t|--type <type> -v|--value <value>

The script should retrieve zone ID and relevant DNS entry ID during each execution. Second-level domain should be deduced from the subdomain argument. Note that the script must fail in case of an error, even if the error occurs before a pipe; look into the *pipefail* option of Bash.

The script must be modular. E.g., if the same *curl* command is executed with slight variations in several places, write a function that accepts arguments which are used to augment the command, handles curl errors, etc.

See Appendix 1 for a synopsis and execution examples. Note that instead of the *--credentials* parameter, an environment variable may be defined.

Good luck!

[2] https://api.cloudflare.com/

Appendix 1

```
~/ex3$ ./cf-dns --help 1>/dev/null

Manipulate CloudFlare DNS entries.

cf-dns -h
    Show this synopsis.

cf-dns [-q|--quiet] [-c|--credentials <email>:<apikey>]
       -g|--get <subdomain> -t|--type <type>
    Print contents of all matching DNS entries of given type for a domain.

cf-dns [-q|--quiet] [-c|--credentials <email>:<apikey>]
       -u|--update <subdomain> -t|--type <type>
    Set or update contents of DNS entry of given type for a domain.
    This command assumes that there is at most one such entry.

CF_CREDENTIALS environment variable may be used instead of
-c|--credentials switch.

~/ex3$ ./cf-dns --quiet --get scetest.tk
cf-dns: CloudFlare credentials not specified

~/ex3$ ./cf-dns --get scetest.tk --credentials
cf-dns: option '--credentials' requires an argument

~/ex3$ ./cf-dns --get scetest.tk --credentials aaa
cf-dns: credentials do not contain an email component

~/ex3$ ./cf-dns --get scetest.tk --credentials aaa@bbb.com
cf-dns: credentials do not contain an API component

~/ex3$ ./cf-dns --get scetesttk --credentials aaa@bbb.com:cccccc --type a
cf-dns: subdomain does not look right

~/ex3$ ./cf-dns --get scetest.tk --credentials aaa@bbb.com:cccccc
cf-dns: DNS entry type not specified

~/ex3$ ./cf-dns --get scetest.tk --credentials aaa@bbb.com:cccccc --type a hello
cf-dns: unknown extra arguments

~/ex3$ ./cf-dns --get scetest.tk --credentials aaa@bbb.com:cccccc --type a
curl: (22) The requested URL returned error: 400 Bad Request
cf-dns: could not invoke CloudFlare API (bad credentials?)

~/ex3$ ./cf-dns --quiet --get scetest.tk --credentials aaa@bbb.com:cccccc --type a;
echo $?
cf-dns: could not invoke CloudFlare API (bad credentials?)
1

~/ex3$ export CF_CREDENTIALS=test@noexec.org:xxxxxxxxx-real-api-key-here-xxxxxxxxx

~/ex3$ ./cf-dns --get noscetest.tk --type a
cf-dns: could not retrieve zone ID, probably wrong domain

~/ex3$ ./cf-dns --get www.scetest.tk --type a
127.0.0.1
```

```
~/ex3$ ./cf-dns --get zzz.scetest.tk --type a
cf-dns: DNS entry not found

~/ex3$ ./cf-dns --get www.scetest.tk --type xx
cf-dns: DNS entry not found

~/ex3$ ./cf-dns --update www.scetest.tk --type a --value 127.0.0.2
Updating existing entry

~/ex3$ ./cf-dns --update www.scetest.tk --type a --value 300.300.300.300
Updating existing entry
curl: (22) The requested URL returned error: 400 Bad Request
cf-dns: could not invoke CloudFlare API (bad credentials?)

~/ex3$ ./cf-dns --get www.scetest.tk --type a
127.0.0.2

~/ex3$ host -t a www.scetest.tk
www.scetest.tk has address 127.0.0.2

~/ex3$ ./cf-dns --update test.scetest.tk --type cname --value "scetest.tk"
Creating new entry

~/ex3$ host test.scetest.tk
test.scetest.tk is an alias for scetest.tk.
scetest.tk has address 127.0.0.1
```