

# Homework 2

## Shell Script

tsclu

國立陽明交通大學資工系資訊中心

Information Technology Center, Department of Computer Science NYCU

# Usage

- Please provide a executable shell script with following available options:

```
$ hw2.sh -a  
hw2.sh -i INPUT -o OUTPUT [-c csv|tsv] [-j]
```

Available Options:

```
-i: Input file to be decoded  
-o: Output directory  
-c csv|tsv: Output files.[ct]sv  
-j: Output info.json
```

# Error Return Code

- Invalid arguments should be rejected with a non-zero status code, with the exact help message outputted to **stderr**.

```
$ hw2.sh -a  
hw2.sh -i INPUT -o OUTPUT [-c csv|tsv] [-j]
```

Available Options:

```
-i: Input file to be decoded  
-o: Output directory  
-c csv|tsv: Output files.[ct]sv  
-j: Output info.json
```

# Input File Specification - Introduction

- The to-be-decoded file should have a extension **.hw2**  
which is actually a YAML file.

# Input File Specification - Definition

name: `example.hw2`

author: `generator`

date: `1696164685`

files:

- name: `example.txt`

- type: `file`

- data: `>-`

`TG9yZW0gaXBzdW0gZG9sb3Igc2l0IGFtZXQsIGNvbmlY3RldHVyIGFkaXBpc2NpbmcgZWxpdC4gTWF1cm1zIGVsZWlmZW5kIHN1bSBsZW8sIGlkIHRpbmNpZHVudCBsb3JlbSB2ZW51bmF0aXMgZWdldC4=`

- hash:

- md5: `9ce543926bc4f3d67368b58e61fb7710`

- sha-1: `375177a2829947c4cefbf756443c6451daab25e3`

`example.hw2`

# Input File Specification - Definition

```
name: example.hw2
author: generator
date: 1696164685
files:
  - name: example.txt
    type: file
    data: >-

TG9yZW0gaXBzdW0gZG9sb3Igc2
IHN1bSBsZW8sIGlkIHRpbmNpZH
hash:
  md5: 9ce543926bc4f3d
  sha-1: 375177a282994
```

example.hw2

- Note:
  - `files.length`  $\geq 0$ .
  - `files[*].name` will always not exact equal to either **files.csv** or **info.json** since they are reserved.
  - `files[*].type` is always "file" or "hw2".
  - `files[*].name` may imply a non-flatten folder structure. In this case, the required folder should be made. See `generated.hw2` in the Sample Input.
  - The .hw2 files are not guaranteed to be pretty-printed.

# Expected Output files - Structure

- You should write the required files to the designated output directory as output.
- The following file tree is expected if **example.hw2** is the input file.

```
.  
└─ outputDir/  
    ├── example.txt  
    ├── files.csv  
    └─ info.json
```

# Expected Output files - Contents

```
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris eleifend sem leo, id  
tincidunt lorem venenatis eget.
```

example.txt

```
filename,size,md5,sha1  
example.txt,116,9ce543926bc4f3d67368b58e61fb7710,f1d2e348391c502880eb246184f542556005874b
```

files.csv



# Expected Output files - Contents

```
filename    size    md5    sha1
example.txt  116    9ce543926bc4f3d67368b58e61fb7710
f1d2e348391c502880eb246184f542556005874b
```

files.tsv

- '\t' will not be included in filename.

```
{
  "name": "example.hw2",
  "author": "generator",
  "date": "2023-10-01T20:51:25+08:00"
}
```

info.json

# Shellcheck

- ShellCheck is a static analysis tool for shell scripts. It helps catch errors and suggests improvements to make your scripts better.
- `shellcheck -s sh -a [your_script]` (should return zero)
- Version : 0.9.0

# Recursive Decoding

```
name: example2.hw2
author: generator
date: 1696164685
files:
  - name: example.hw2
    type: hw2
    data: >-
```

- Note:
  - Recursively decode it when type is hw2.
  - The recursive rule should be activated if option -c and -j are both not enabled.

```
bmFtZTogZXhhbXBsZS5odzIKYXV0aG9yOiBnZW51cmF0b3IKZGF0ZTogMTY5NjE2NDY4NQpmaWx1czoKICAtIG5hbWU6IGV4
YW1wbGUudHh0CiAgICB0eXB1OiBmaWx1CiAgICBkYXRhOiA+LQogICAgICBURz15W1cwZ2FYQnpkVzBnWkc5c2IzSWdjMmww
SudGdFpYUXNJR052Ym50bFkzUmxkSFZ5SudGa2FYQnBjMk5wYm1jZ1pXeHBkQzRnVdGMWntbHpJR1ZzWldsVpXNwtJSE5s
YlNCc1pXOHNJR2xrSUhScGJtTnBaSFZ1ZENCc2IzSmxiU0IyWlclbGJtRjBhWE1nWldkbGRDND0KICAgIGhhc2g6CiAgICAg
IG1kNTogOWNlNTQzOTI2YmM0ZjNkNjczNjhINThlNjFmYjc3MTAKICAgICAgc2hhLTE6IDM3NTE3N2EyODI5OTQ3YzRjZWZi
Zjc1NjQ0M2M2NDUxZGFhYjI1ZTMKCg==
```

```
hash:
```

```
md5: 97b3bb3e66dc3423e651523294fbfce0
```

```
sha-1: 1f100bee54f9f1cc53ac7d052992e9b19a69e70e
```

# Recursive Decoding - After decode

```
name: example.hw2
```

```
author: generator
```

```
date: 1696164685
```

```
files:
```

```
  - name: example.txt
```

```
    type: file
```

```
    data: >-
```

```
TG9yZW0gaXBzdW0gZG9sb3Igc2l0IGFtZXQsIGNvbmlY3RldHVyIGFkaXBpc2NpbmcgZWxpdC4gTWF1cm1zIGVsZWlmZW5k  
IHN1bSBsZW8sIGlkIHRpbmNpZHVudCBsb3JlbSB2ZW51bmF0aXMgZWdldC4=
```

```
hash:
```

```
  md5: 9ce543926bc4f3d67368b58e61fb7710
```

```
  sha-1: 375177a2829947c4cefbf756443c6451daab25e3
```

## Recursive Decoding - Expected Output Files' Structure

- You should write the required files to the designated output directory as output.
- The following file tree is expected if **example2.hw2** is the input file.

```
.  
└─ outputDir/  
    └─ example.txt  
    └─ example.hw2
```

# Requirements

- Please place your script at **/home/judge/hw2.sh**, with executable bit set.
- The script should start with a proper shebang (**#!/bin/sh**, other shells are **not** allowed.)
- Make sure **/tmp** is writable for the **judge** user.
- SFTP support for the SSH server is required.
- Your script should return the count of *Invalid Files* (which **any** of its checksum mismatches).

# Restrictions

- Must not call network tools (such as curl, wget...)
- Must not use any other interpreters, compilers or programming languages (such as Python, Ruby, Node.js, Golang, Rust, Perl, GCC, Clang...)
- Must not call any other self-written scripts, binaries or executables.
- Only one shell, **sh**, is allowed.
- Common tools (e.g. date, openssl, yq, etc.) are allowed.
- If you are not sure whether a tool is allowed, please ask TA on Google Groups.

# Grading

Automated grading (Online Judge), 104 pts.

- Usage
  - Invalid options
    - Exit Code (3%)
    - Help Message (4%)
  - Invalid files (8%)
- Shellcheck (10%)
- Input and Output files
  - Arbitrary argument position (10%)
  - Extract single file (10%)
  - Extract multiple files (15%)
  - Output nested directories (10%)
  - Extract & Output **file.csv** (8%)
  - Extract & Output **info.json** (10%)
  - Extract & Output **file.tsv** (6%)
  - Recursion (10%)



# HW 2: Sample input

<https://nasa.cs.nycu.edu.tw/sa/2023/slides/hw2-sample.tar>

# SH(1): getopt

**getopts** *optstring var*

The POSIX **getopts** command. The **getopts** command deprecates the older **getopt(1)** command.

The first argument should be a series of letters, each possibly followed by a colon which indicates that the option takes an argument. The specified variable is set to the parsed option. The index of the next argument is placed into the shell variable **OPTIND**. If an option takes an argument, it is placed into the shell variable **OPTARG**.

# Attention!

- Set the IP address **10.113.\$ID.11**
- You are restricted to use only **sh** to complete your work
  - That is, no other shell and no other programming language is allowed.
  - If you're not sure what's allowed, contact TAs.
  - TAs reserve the right of final explanations. Specs and the points of each sub-judges are subject to change in any time.
- Start from: **Thu, 10/5 19:00**
- Due date: **Wed, 10/25 23:59**



# Help me! TA!

- Questions about this homework
  - Ask questions on <https://groups.google.com/g/nctunasa>
  - We MIGHT give out hints on google group
    - Be sure to join the group :D
  - Do not email us directly
  - Do not use E3 to email us
- How To Ask Questions The Smart Way
  - <https://github.com/ryanhhanwu/How-To-Ask-Questions-The-Smart-Way>

# Good Luck!

國立陽明交通大學資工系資訊中心

Computer Center of Department of Computer Science, NYCU