A short AWK introduction

https://github.com/mschmnet/awk-slides

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Why should I use AWK for?

> I need to process an input file by splitting it up in **records** and **fields**

How are files split into *records* and *fields*?

- By default the input record separator is `\n` and the dafault field separator is any number of **spaces** and/or **tabs** and/or **new line** characters.
- The defaults can be changed with the special variables `RS` (*Record Separator*) and `FS` (*Field Separator*)
- The *field separator* can be an extended regular expression

What is the AWK's input?

- It can be *standard input*
- It can be one or more file
- It can be mixed (one or more files + *standard input*)

Multiple input files

- You can specify multiple files: `awk '{print $1}' input.txt input-2.txt`
- You can mix files with *standard input*: `cat input.txt | awk '{print $1}' - input-2.txt`
- You can distinguish between first and subsequent files comparing special variables `NR` and `FNR`: `awk 'NR == FNR{print "From 1st file: " $0}NR != FNR{print "From 2nd file: " $0}' input.txt input-2.txt`

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Where to put your awk code

- Inline: `awk '{print $1}' input.txt`
- In a separate file

```
#!/usr/bin/awk -f

{
  print $1
}
```

- You can execute it with `awk -f ./script.awk input.txt`
- Or you can assign execution permission to the file and execute it directly: `chmod +x script.awk; ./script.awk < input.txt`

Main blocks

- `BEGIN{}` : This block of code is executed *before* the first record is processed
- `END{}` : This block is executed *after* the last record has been processed
- A `{}` block is execute on every *record*.
- There are other blocks like `BEGINFILE{}`

Example (input: temperature-salamanca.csv)

```
"Salamanca Aeropuerto"
Actualizado: martes, 16 julio 2019 a las 18:42 hora oficial

"Fecha y hora oficial","Temperatura (ºC)",[...],"Humedad (%)"
"16/07/2019 18:00","32.0",[...],"26"

[...]

"15/07/2019 19:00","30.8",[...],"24"
```

Example (code: temperature.awk)

```
#!/usr/bin/awk -f

BEGIN{
  FS="\(\",\"\)\|\(\"\)";
}
$2 ~ /^[0-9][0-9]\/[0-9][0-9]\/[0-9]{4} [0-9][0-9]:[0-9][0-9]$/{
  date_time=$2;
  temperature=$3;
  humidity=$11;
  total_temperature+=temperature;
  total_humidity+=humidity;
  n++;
}
END{
  printf "Average temperature: %.2f\n", total_temperature / n;
  printf "Average humidity: %.0f\n", total_humidity / n;
}
```

Example (output)

```
./temperature.awk < temperature-salamanca.csv

Average temperature: 23.96
Average humidity: 42
```

Record processing

- To every record a list of pairs applies. Every pair is made up of:
  - A **condition** that checks if following code block must be executed or not
    - If missing, following code block will be executed
  - **Executable code** (within curly braces)
    - If missing, complete record will be printed (`{print $0}`)

Record processing (examples)

- Both, condition and code block, are present: `awk '$1 ~ /one/{print "Number 1"}' < input.txt`
- Condition is missing: `awk '{print "Number " $1}' < input.txt` (same as `'1{print "Number " $1}'`
- Code block is missing: `awk '$1 ~ /one/' < input.txt` same as `$1 ~ /one/{print $0}`
- More than one pair may exist: `awk '0{print "This will never be printed"}1{print "This will always be printed"}' < input.txt`

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Nature of arrays

- Arrays are associative. Awk doesn't have linked lists.
- Arrays in awk can be looped through with a *for each* syntax, but you don't get insertion order.
- If you want insertion order you have to use an incremental index and use a regular loop with an incremental index (`for(i=1;i<=length(a);i++) {print a[i];}`)

A few examples with arrays (1)

Column 3 of `Average_Daily_Traffic_counts.csv` is a street name. Print the first record for every street (uniq by column)

```
awk -F"," '!_[$3]++' Average_Daily_Traffic_counts.csv
```

A few examples with arrays (2)

Column 3 of `Average_Daily_Traffic_counts.csv` is a street name. Print the number of occurences.

```
BEGIN{
  FS=",";
  OFS=" ==> "
}
NR >= 1{
  _[$3]++
}
END{
  for(el in _){
    print el, _[el];
  }
}
```

Multidimensional arrays

They aren't really multidimensional. But, who cares? Or maybe you should?

```
a["2019", "Salamanca"]=1342

for(el in a){
  print el, a[el]
  # ??
}
```

Multidimensional arrays (example)

```
#!/usr/bin/awk -f

BEGIN{
  FS=",";
}
NR > 1{
  _[$4,$3]++;
}
END{
  for(el in _){
    split(el, keys, SUBSEP);
    printf "%-15s %-30s %10d\n", keys[1], keys[2], _[el];
  }
}
```

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Functions

```
#!/usr/bin/awk -f

BEGIN{
 print_text("Hello world");
}

function print_text(text_parameter){
  print "This function prints the parameter: " text_parameter;
}
```

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Environment variables

```
awk -v home_dir=$HOME 'BEGIN{print home_dir}'
```

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External commands (sigle result)

```
#!/usr/bin/awk -f

BEGIN{
  command_get_date="date +\"%d-%m-%Y\""
  command_get_date | getline result;
  close(command_get_date);
  print "Today is " result;
}
```

External commands (multiple lines)

```
#!/usr/bin/awk -f

BEGIN{
  command_cat="cat ./input.txt";
  while (( command_cat | getline line) > 0){
    print "Line is: " line;
  }
  close(command_cat);
}
```

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https://stackoverflow.com/a/28463193/6939011

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Ranges (regular way)

```
awk '/15:00/,/05:00/' < temperature-salamanca.csv
```

Ranges (custom way)

```
#!/usr/bin/awk -f
/15:00/{
  want_print=1;
  #next;
}
want_print{
  print $0;
}
/05:00/{
  want_print=0
}
```

The End

Thank you very much