

BASH SCRIPTING

Strings

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Cut command

To cut by using the hyphen (-) as the delimiter, execute the below command:

```
cut -d- -f(columnNumber) <fileName>
```

If we want to use space as a delimiter, then we have to quote the space (' ') with the cut command. To cut the output by using space as delimiter, execute the command as follows:

```
cut -d ' ' -f(columnNumber) <fileName>
```

The '-b' option is used to cut a section of line by byte. To cut a file by its byte position, execute the command as follows:

```
cut -b <byte number> <file name>
```

The '-c' option is used to cut a specific section by character. However, these character arguments can be a number or a range of numbers, a list of comma-separated numbers, or any other character.

To cut by specified character, execute the command as follows:

```
cut -c <characters> <file name>
```

Awk

Awk is a scripting language used for manipulating data and generating reports. The awk command programming language requires no compiling and allows the user to use variables, numeric functions, string functions, and logical operators.

```
awk [options] 'selection_criteria {action}' input-file
```

The `awk` command's main purpose is to make information retrieval and text manipulation easy to perform in Linux. This [Linux command](#) works by scanning a set of input lines in order and searches for lines matching the patterns specified by the user.

What awk can do?

- (a) Scans a file line by line
- (b) Splits each input line into fields
- (c) Compares input line/fields to pattern
- (d) Performs action(s) on matched lines

1. Default behavior of Awk: By default Awk prints every line of data from the specified file.

```
$ awk '{print}' datafile
```

2. Print the lines which match the given pattern.

```
$ awk '/manager/ {print}' employee.txt
```

What awk can do?

3. Splitting a Line Into Fields : For each record i.e line, the awk command splits the record delimited by whitespace character by default and stores it in the \$n variables. If the line has 4 words, it will be stored in \$1, \$2, \$3 and \$4 respectively. Also, \$0 represents the whole line.

```
$ awk '{print $1,$4}' datafile
```

Built in Commands for awk

Awk's built-in variables include the field variables—\$1, \$2, \$3, and so on (\$0 is the entire line) — that break a line of text into individual words or pieces called fields.

- **NR:** NR command keeps a current count of the number of input records. Remember that records are usually lines. Awk command performs the pattern/action statements once for each record in a file.
- **NF:** NF command keeps a count of the number of fields within the current input record.
- **FS:** FS command contains the field separator character which is used to divide fields on the input line. The default is “white space”, meaning space and tab characters. FS can be reassigned to another character (typically in BEGIN) to change the field separator.
- **RS:** RS command stores the current record separator character. Since, by default, an input line is the input record, the default record separator character is a newline.
- **OFS:** OFS command stores the output field separator, which separates the fields when Awk prints them. The default is a blank space. Whenever print has several parameters separated with commas, it will print the value of OFS in between each parameter.
- **ORS:** ORS command stores the output record separator, which separates the output lines when Awk prints them. The default is a newline character. print automatically outputs the contents of ORS at the end of whatever it is given to print.

AWK Variables

The `awk` command has built-in field variables, which break the input file into separate parts called fields. The `awk` assigns the following variables to each data field:

- `$0`. Used to specify the whole line.
- `$1`. Specifies the first field.
- `$2`. Specifies the second field.

Find Duplicates in a Row

```
bosko@bosko-vm:~$ cat ~/answers.txt
```

```
a,1,1  
b,3,4  
c,5,2  
d,6,1  
e,3,3  
f,3,7
```

```
bosko@bosko-vm:~$ awk -F ',' '{if($2==$3){print $1,""$2,""$3} else {print "No Duplicates"}}' answers.txt
```

```
a,1,1  
No Duplicates  
No Duplicates  
No Duplicates  
e,3,3  
No Duplicates
```



Print the table attributes row-wise

```
bosko@bosko-vm:~$ awk '{i=0; while(i<=NF) { print i ":"$i; i++;}}' employees.txt  
0:Adeline Bird clerk $654  
1:Adeline  
2:Bird  
3:clerk  
4:$654  
0:Weston Bradley clerk $789  
1:Weston  
2:Bradley  
3:clerk  
4:$789
```

For loop and Awk

```
bosko@bosko-vm:~$ awk 'BEGIN{for(i=1; i<=10; i++) print "The square of", i, "is", i*i  
;}'
```

```
The square of 1 is 1  
The square of 2 is 4  
The square of 3 is 9  
The square of 4 is 16  
The square of 5 is 25  
The square of 6 is 36  
The square of 7 is 49  
The square of 8 is 64  
The square of 9 is 81  
The square of 10 is 100
```



Awk-Patterns

Inserting a pattern in front of an action in `awk` acts as a selector. The selector determines whether to perform an action or not. The following expressions can serve as patterns:

- Regular expressions.
- Arithmetic relational expressions.
- String-valued expressions.
- Arbitrary Boolean combinations of the expressions above.

Awk-Regex

Regular Expression Patterns

Regular expression patterns are the simplest form of expressions containing a string of characters enclosed in slashes. It can be a sequence of letters, numbers, or a combination of both.

In the following example, the program outputs all the lines starting with "A". If the specified string is a part of a larger word, it is also printed.

```
awk '$1 ~ /^A/ {print $0}' employees.txt
```

```
bosko@bosko-vm:~$ awk '$1 ~ /^A/ {print $0}' employees.txt  
Adeline Bird clerk $654  
Anaya Rice director $1334  
Andre Wilkins clerk $446  
Allen Thomas IT $7854
```

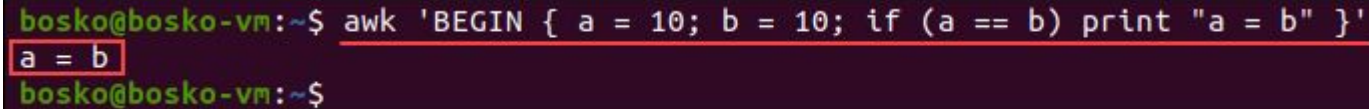
AWK-Relational Expression

Relational Expression Patterns

Another type of `awk` patterns are relational expression patterns. The relational expression patterns involve using any of the following relational operators: `<`, `<=`, `==`, `!=`, `>=`, and `>`.

Following is an example of an `awk` relational expression:

```
awk 'BEGIN { a = 10; b = 10; if (a == b) print "a == b" }'
```



```
bosko@bosko-vm:~$ awk 'BEGIN { a = 10; b = 10; if (a == b) print "a = b" }'  
a = b  
bosko@bosko-vm:~$
```

Awk-Range

A range pattern is a pattern consisting of two patterns separated by a comma. Range patterns perform the specified action for each line between the occurrence of pattern one and pattern two.

For example:

```
awk '/clerk/, /manager/ {print $1, $2}' employees.txt
```

```
bosko@bosko-vm:~$ awk '/clerk/, /manager/ {print $1, $2}' employees.txt  
Adeline Bird  
Weston Bradley  
Anaya Rice  
Andre Wilkins  
Ian Norris  
Omar Landry  
Harley Edwards  
Marie Snow
```


Awk-Special Expressions

Special expression patterns include `BEGIN` and `END` which denote program initialization and end. The `BEGIN` pattern matches the beginning of the input, before the first record is processed. The `END` pattern matches the end of the input, after the last record has been processed.

For example, you can instruct `awk` to display a message at the beginning and at the end of the process:

```
awk 'BEGIN { print "List of debtors:" }; {print $1, $2}; END {print "End of the debtor list"}' debtors.txt
```

```
bosko@bosko-vm:~$ awk 'BEGIN { print "List of debtors:" }; {print $1, $2}; END {print "End of the debtor list"}' employee-debt.txt
```

List of debtors: 

employees-debt

Maria 2334

John 5646


Gendry 8998

Bill 133

Edgar 758

Jake 0

Milford 0

End of the debtor list 

Awk combining patterns

Combining Patterns

The `awk` command allows users to combine two or more patterns using logical operators. The combined patterns can be any Boolean combination of patterns. The logical operators for combining patterns are:

- `||` (or)
- `&&` (and)
- `!` (not)

For example:

```
awk '$3 > 10 && $4 < 20 {print $1, $2}' employees.txt
```

```
bosko@bosko-vm:~$ awk '$3 > 10 && $4 < 20 {print $1, $2}' employees.txt
Adeline Bird
Weston Bradley
Anaya Rice
Andre Wilkins
Ian Norris
Omar Landry
Harley Edwards
Marie Snow
Haylee Sweeney
Isis Ware
Jaelyn Khan
Julio Estrada
Allen Thomas
Isiah Hester
Jan Harper
Zachery Richard
```

Sed-stream editor

```
sed OPTIONS... [SCRIPT] [INPUTFILE...]
```

- SED is a powerful text stream editor. Can do insertion, deletion, search and replace(substitution).
- SED command in unix supports regular expression which allows it perform complex pattern matching.

Sed-Replacing or substituting 1st occurrence of a pattern

```
sed 's/unix/linux/' textfile
```

Sed- Replace the nth occurrence of a pattern

```
sed 's/unix/linux/2' textfile
```

Sed - Replacing or substituting all occurrence of a pattern

```
sed 's/unix/linux/g' textfile
```

Sed- replacing from nth occurrence of a pattern to last

```
sed 's/unix/linux/3g' textfile
```

Sed- replacing string on the nth line

```
sed '3 s/unix/linux/' textfile
```

Sed- replacing string on a range of lines

```
sed '1,3 s/unix/linux/' textfile
```


Sed-deleting

1. To Delete a particular line say n in this example

Syntax:
`$ sed 'nd' filename.txt`

Example:
`$ sed '5d' filename.txt`

2. To Delete a last line

Syntax:
`$ sed '$d' filename.txt`

3. To Delete line from range x to y

Syntax:
`$ sed 'x,yd' filename.txt`
Example:
`$ sed '3,6d' filename.txt`

4. To Delete from nth to last line

Syntax:
`$ sed 'nth,$d' filename.txt`
Example:
`$ sed '12,$d' filename.txt`

5. To Delete pattern matching line

Syntax:
`$ sed '/pattern/d' filename.txt`
Example:
`$ sed '/abc/d' filename.txt`

sed-Insert a line

1 – Insert one blank line after each line –

```
sed G a.txt
```

2 – To insert two blank lines –

```
sed 'G;G' a.txt
```

3 – Insert 5 spaces to the left of every lines –

```
sed 's/^/    /' a.txt
```

Sed-numbering lines

1 – Number each line of a file (left alignment). `**=**` is used to number the line. `\t` is used for tab between number and sentence –

```
sed = a.txt | sed 'N;s/\n/\t/'
```

3 – Number each line of file, only if line is not blank –

```
sed '/./=' a.txt | sed '/./N; s/\n/ /'
```

Head Command

The Linux `head` command prints the first lines of one or more files (or piped data) to standard output. By default, it shows the first 10 lines. However, `head` provides several arguments you can use to modify the output.

1. Display first 10 lines of a file

```
$ head example1.txt
```

2. show the first 4 lines

```
$ head -n 4 example1.txt
```

3. to see 20 bytes of output of the sample file, you would run the command:

```
$ head -c 20 example1.txt
```

4. first lines of files *example1.txt* and *example2.txt*, you would type:

```
$ head example1.txt example2.txt
```

5. to list files in the */etc* directory using the `ls` command and print 10 entries, you would run the command:

```
$ ls /etc | head
```

Tail Command

Linux tail command is used to display the last ten lines of one or more files. Its main purpose is to read the error message. By default, it displays the last ten lines of a file.

- 1. By default “tail” prints the last 10 lines of a file, then exits.**

```
$ tail /path/to/file
```

- 2. the -n option comes handy, to choose specific number of lines instead of the default 10**

```
$ tail -n 4 /etc/group
```

Assignment

Write a script to use grep,awk/sed to find the network interfaces and their associated ip addresses. The output should be in the form of a table

| NW_Iface | IP |
|----------|---------------|
| Eth0 | 192.168.22.18 |
| L0 | 127.0.0.1 |