UNIX

AWK Programming

Lesson Objectives

- At the end of the session you is able to understand:
  - How to write simple *awk* scripts.

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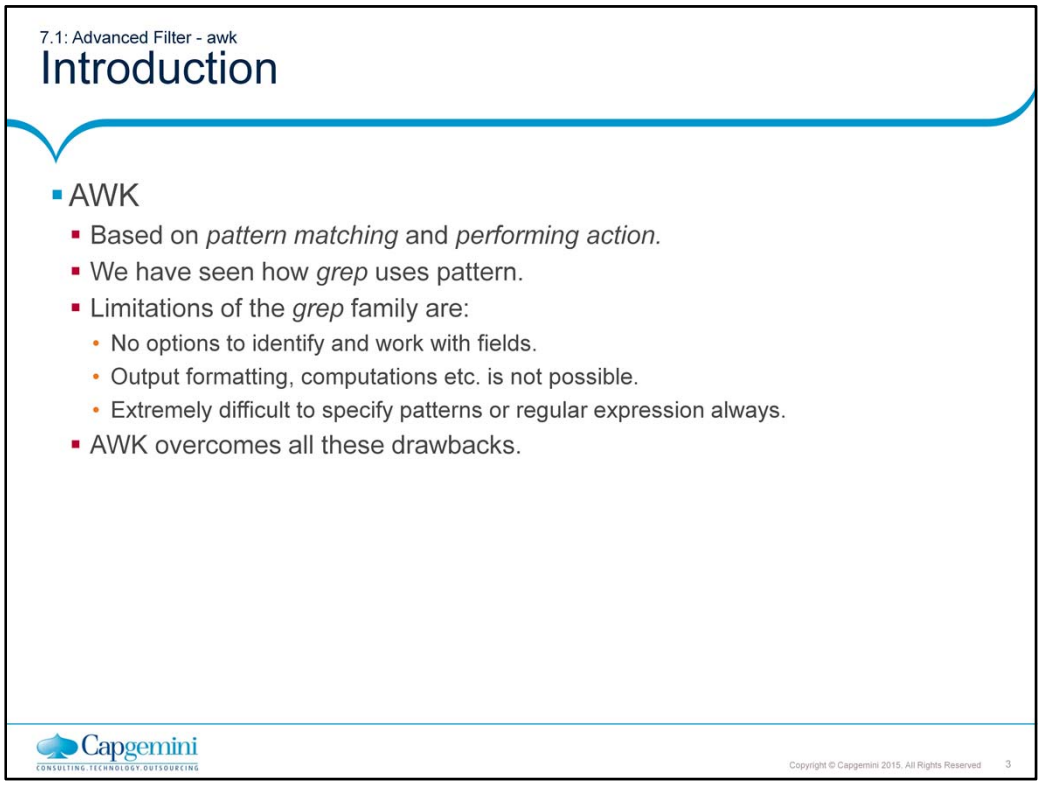
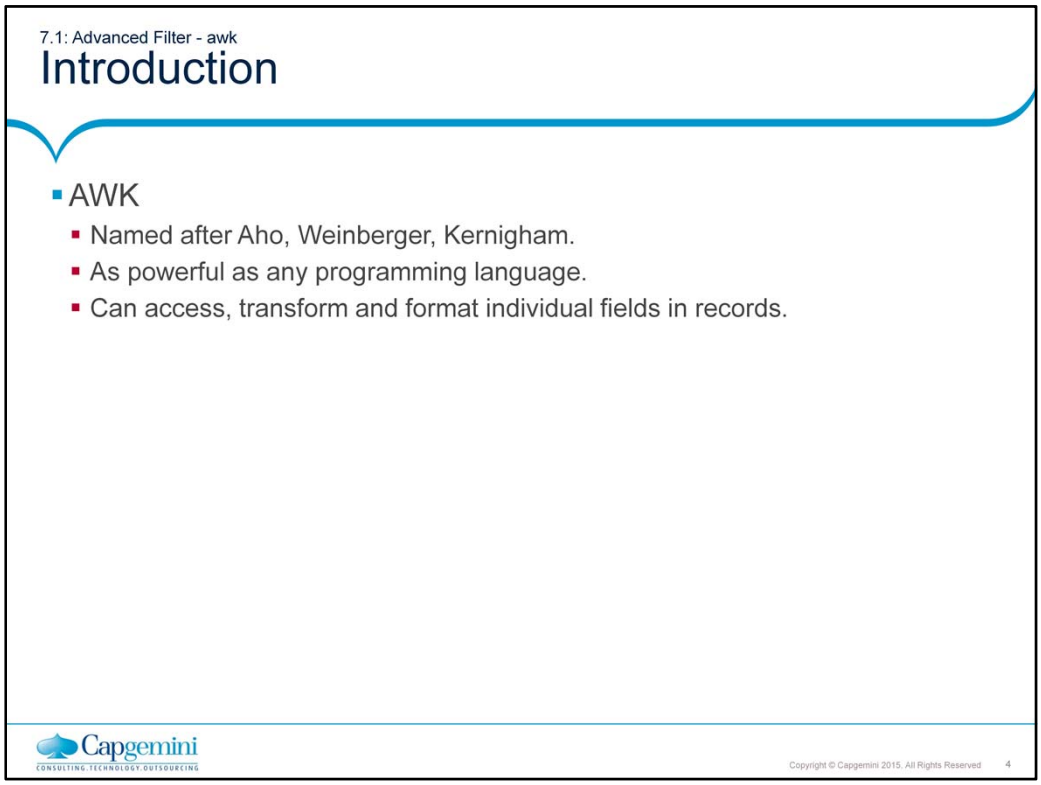
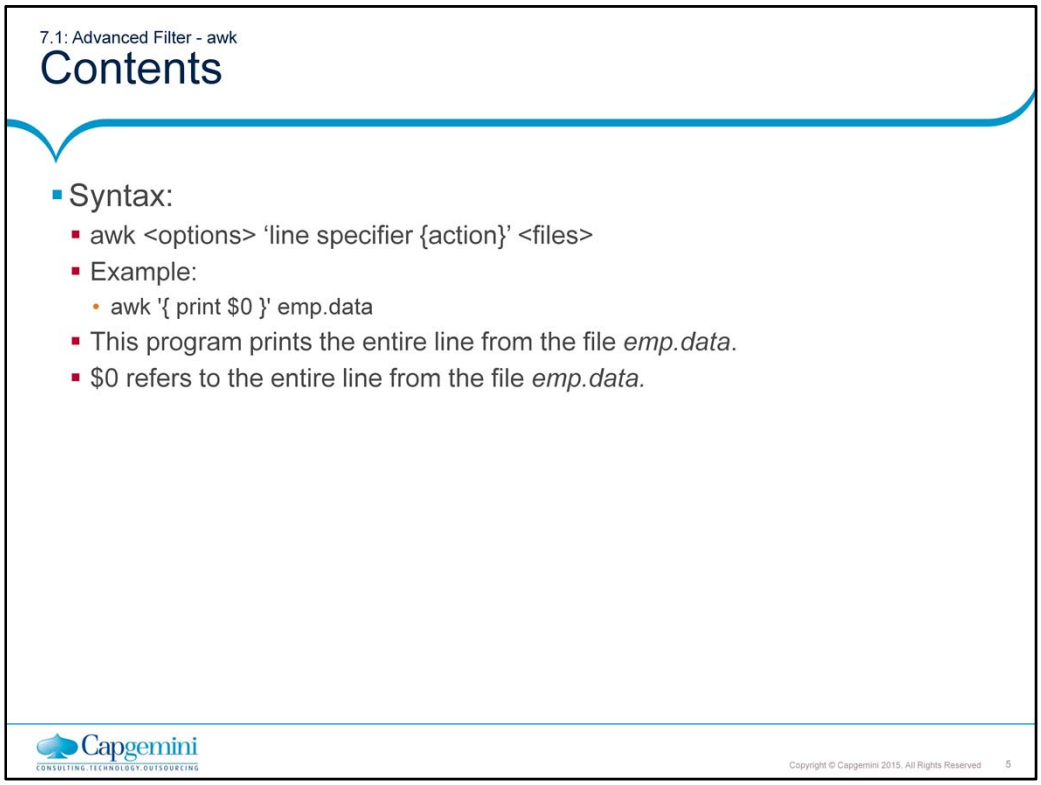


The *awk* command, named after its authors Aho, Weinberger and Kernighan, is one of the most powerful utilities for text manipulation. It combines features of many other filters. It can access, transform and format individual fields in a record – it is also called as a report writer. It can accept regular expressions for pattern matching, has “C” type programming constructs, variables and in-built functions. In fact, awk is nearly as powerful as any other programming language. However, awk programs are generally slow, if any alternative commands are available to do the same use them rather than using AWK.



Filters accept some data as input, perform some manipulation on it and produce some output. Some simple filters have been discussed in the previous chapters. This chapter discusses advanced filter –*awk*.



Advanced Filter awk.

The general syntax of the awk command is:

awk <options> 'line specifier {action}' <file(s)>

Simple awk Filtering

Following is an example of a simple awk command:

It prints all lines from file *books.lst* in which pattern 'Computer' is found.

$ awk '/Computer/ {print}' books.lst

Output:

```
1001|Learning Unix              |Computers    |01/01/1998| 575
1003|XML Unleashed              |Computers    |20/02/2000| 398
1004|Unix Device Drivers         |Computers    |09/08/1995| 650
1007|Unix Shell Programming     |Computers    |03/02/1993| 536
```

7.1: Advanced Filter - awk

AWK variables

- Variable List:
  - **$0:** Contains contents of the full current record.
  - **$1..$n:** Holds contents of individual fields in the current record.
  - **NF:** Contains number of fields in the input record.
  - **NR:** Contains number of record processed so far.
  - **FS:** Holds the field separator. Default is *space* or *tab*.
  - **OFS:** Holds the output field separator.
  - **RS:** Holds the input record separator. Default is a new line.
  - **FILENAME:** Holds the input file name.
  - **ARGC:** Holds the number of Arguments on Command line
  - **ARGV:** The list of arguments

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7.1: Advanced Filter - awk

Example

- awk '{ print $1 $2 $3 }' emp.data
  - This prints the *first, second* and *third* column from file *emp.data.*
- awk '{ print }' emp.data
  - Prints all lines (all the fields) from file *emp.data.*

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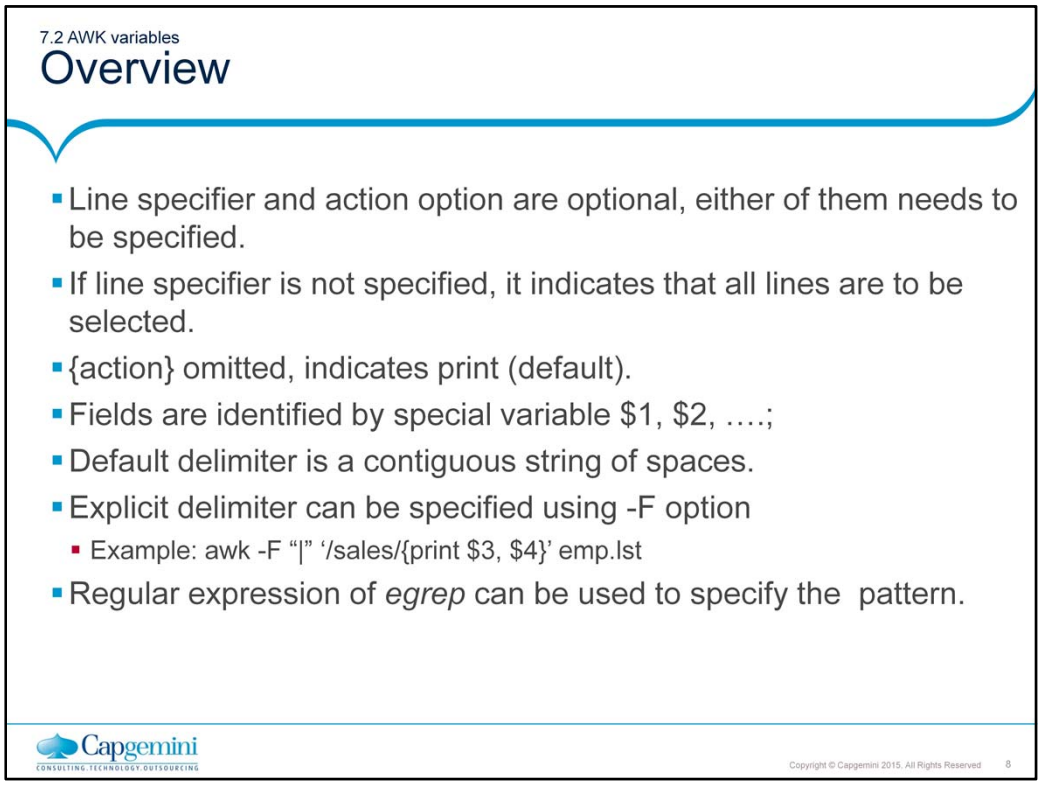


The line specifier uses a context address to specify the lines that need to be taken up for processing in the action section. If the line specifier is missing, then the action is applicable to all lines of the file.

In the action part, statement {print} indicates that selected lines are to be printed. The statement {print} is equivalent to {print $0} - $0 being the variable for the entire line. The awk command is also capable of breaking each line into fields – each field is identified as $1, $2 etc.

For the purpose of identification of fields, awk uses a contiguous string of spaces as field delimiter. However, it is possible to use a different delimiter. This is specified using the –F option in awk.

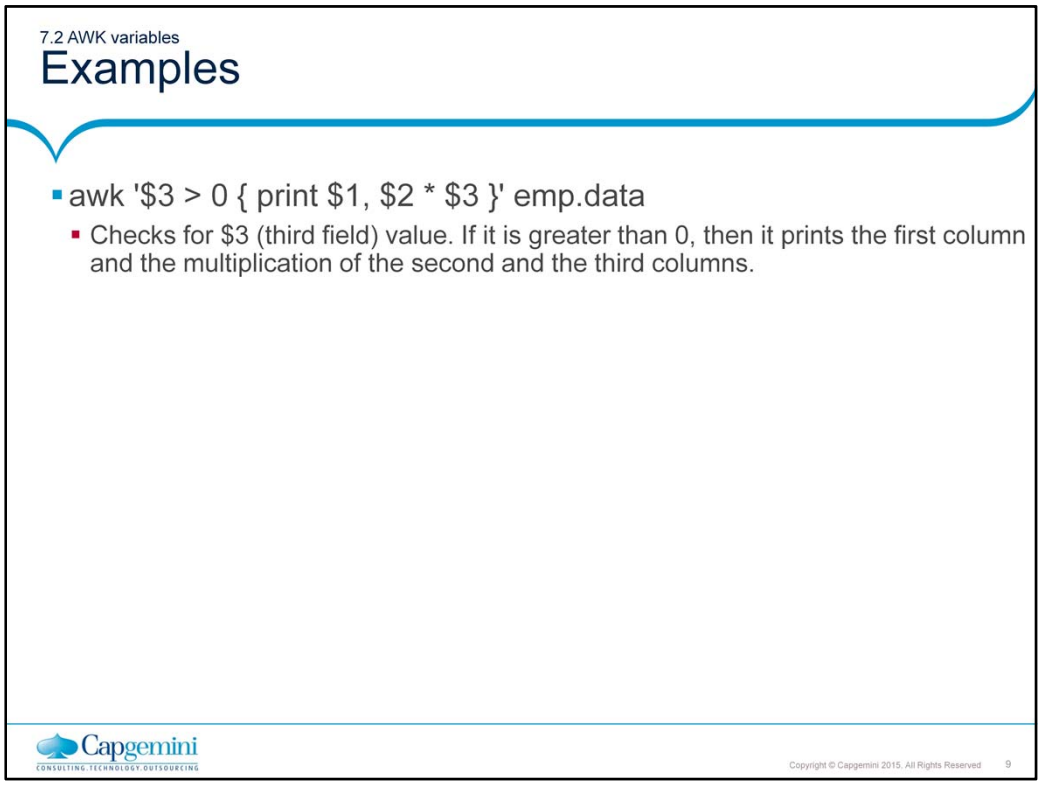
$ awk -F"|" '/Computer/ {print $2,$5}' books.lst
Output:
Learning Unix 575
XML Unleashed 398
Unix Device Drivers 650
Unix Shell Programming 536

For pattern matching, awk uses regular expressions of *egrep* variety.
$ awk -F"|" '/XML|Unix/ {print $2, $5}' books.lst
Output:
Learning Unix 575
XML Unleashed 398
Unix Device Drivers 650
XML Applications 630
Unix Shell Programming 536

It is possible to specify line numbers in file using the inbuilt NR variable. Also, awk can use the C-like *printf* statement to format the output.

$ awk -F"|" '$1=="1002" {printf "%2d,%-20s",NR,$2}' books.lst
Output:
2,Moby Dick

The –f option of awk is useful if you wish to store the line specifier or action in a separate file.

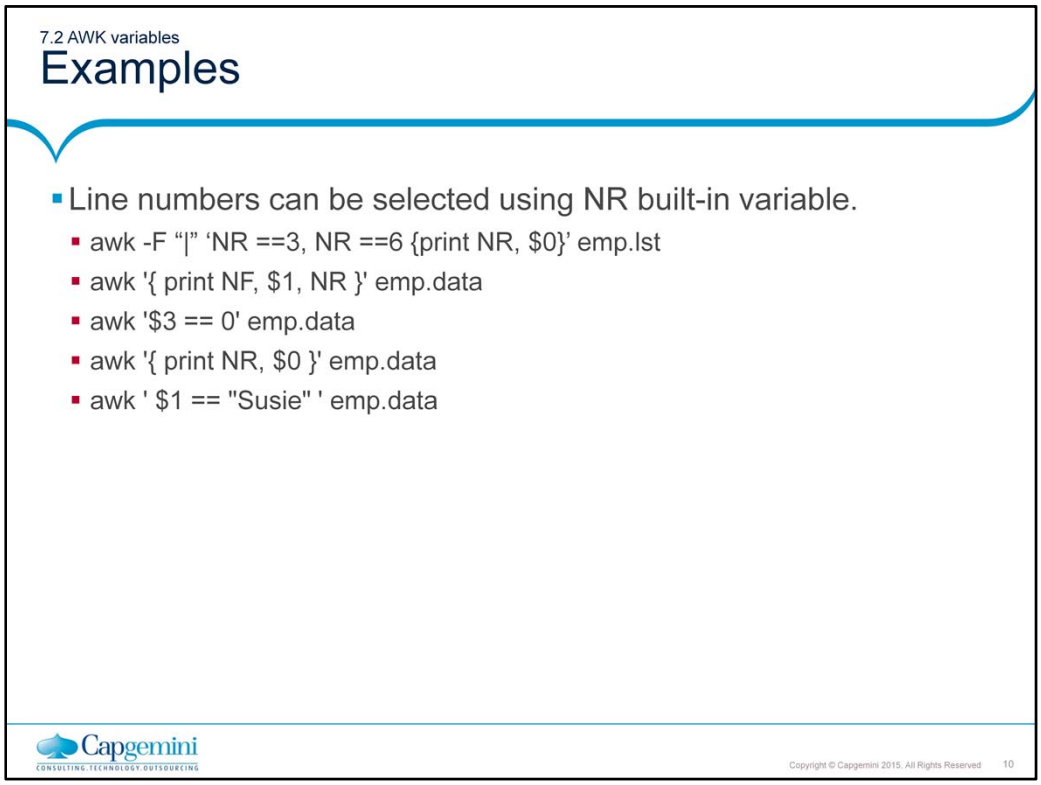


The logical operators || (or) and && (and) are used by the awk command to combine conditions in the line specifier. A relational operator can be used in the line specifier, also in the action component.

The operators == (equal) and != (not equal) can handle only fixed length strings and not regular expressions. To match regular expressions, ~ (match) and !~ (negate) are used. The characters ^ and $ can be used for looking for a pattern in the beginning and end of field.

To work with numbers, operators like < (less than), > (greater than), <= (less than or equal), >= (greater than or equal), == (equal) and != (not equal) can be used.
It is possible to perform computations on numbers using C like arithmetic operators (+, -, *, /, %, ++, --, += etc).
$ awk -F"|" '/Unix/ && $5 < 600 {printf "%s,%d\n",$2,$5}' books.lst
Output:

```
Learning Unix                ,575
Unix Shell Programming   ,536
$ awk -F"|" '$2=="Learning Unix"' books.lst
$ awk -F"|" '$2~/Learning Unix/' books.lst
1001|Learning Unix           |Computers     |01/01/1998| 575
$ awk -F"|" '$5<500 {
> cnt=cnt+1
> printf "%d %s\n",cnt,$2}' books.lst
1 Moby Dick
2 XML Unleashed
```



awk -F "|" 'NR ==3, NR ==6 {print NR, $0}' emp.lst
In this example, NR represents record number. It prints records from *third record* to *sixth* record.
-F is use to specify field separator.

awk '{ print NF, $1, NR }' emp.data
This prints number of fields, contents of field 1 and record number for all records.

awk '$3 == 0' emp.data
It prints all lines in which the value in the third field is 0.

awk '{ print NR, $0 }' emp.data
It will print record number and record for all records

awk ' $1 == "Susie" ' emp.data
It prints all lines in which the value in the first field is Susie.

Summary

- AWK is based on pattern matching and performing action.
- Various built in variable of AWK
- Extracting field from file using AWK

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Review Questions

- Which variable is used to print number of records processed by AWK ?
- How many times action block is executed in AWK?
- Print $0 prints whole record
  - TRUE
  - FALSE

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