

Scripting Languages

Module 7

File Manipulation and Editing
Using Sed

1. Introducing the stream editor **sed** and simple automated text editing
2. Using **sed** to parse text and data files
3. Text substitution
4. Writing and executing more complex **sed** commands

After finishing this module, you should be able to:

- Understand and execute scripts that make use of **sed** to perform simple search and update operations
- Write scripts that can parse text in a meaningful way

What is sed?

- The Stream Editor (sed) can be used to simplify the parsing and formatting process
- **sed** works by searching through text line by line making changes based on given commands

```
sed 'command' [Input file]
```

sed

s is for substitution

The s command

- One of the most common features of sed is to act as a *find and replace* operation.
- The command to replace a found pattern with another is **s** for *substitute*

```
sed 's/color/colour/' inputfile.txt
```

The Substitute command has four (4) parts:

| | |
|-----------------|---|
| s | The Substitute command |
| /../.. | Delimiter(s) |
| String_A | Regular expression pattern / search pattern to be replaced |
| String_B | Replacement string |

```
sed 's/color/colour/'
```

s -> structure

It also requires an *input file/source* to operate on



```
sed 's/color/colour/' inputfile.txt
```


s command with Global Replacement

- By default, **sed** only changes the first occurrence of the specified replacement string on each line it encounters in a file/source
- To disable this default behaviour and have **sed** change all instances of a pattern to the replacement pattern, use the **g** option immediately after the final delimiter.

```
sed 's/color/colour/g' inputfile.txt
```

sed

Examples of Application

sed source -> cat to screen

```
1  <p>Have you ever experienced that feeling when you walk into a room painted with cool colors
2  that you seem to almost immediately feel <i>calmer</i> and more <i>relaxed</i>?
3  This is <b>no</b> coincidence, because the tangible impact of color on the human psyche has been
4  known for centuries. Color has long been used in a wide range of applications to affect and
5  influence peoples' moods, and if fact, you have in all likelihood had your own mood deliberately
6  and subliminally manipulated by third parties, even though you probably don't recognize this is
7  happening.</p><p>One of the primary manipulators of color to affect mood is the advertising industry,
8  that regularly employ this tactic to ellicit specific emotional reactions from their audience to
9  encourage positive buying behaviour. When colors are chosen correctly to this end, sales can be greatly increased,
10 and when chosen poorly, can lead to poor sales and even an adverse reaction against the product being marketed.
```



```
Have you ever experienced that feeling when you walk into a room painted with cool colors
that you seem to almost immediately feel calmer and more relaxed?
This is no coincidence, because the tangible impact of color on the human psyche has been
known for centuries. Color has long been used in a wide range of applications to affect and
influence peoples' moods, and if fact, you have in all likelihood had your own mood deliberately
and subliminally manipulated by third parties, even though you probably don't recognize this is
happening. One of the primary manipulators of color to affect mood is the advertising industry,
that regularly employ this tactic to ellicit specific emotional reactions from their audience to
encourage positive buying behaviour. When colors are chosen correctly to this end, sales can be greatly increased,
and when chosen poorly, can lead to poor sales and even an adverse reaction against the product being marketed.
```

```
1  #!/bin/bash
2  if ! [ -f content.txt ] ; then
3      echo "No file to process."
4      exit 0
5  else
6      cat content.txt | sed 's/<[^>]\+>//g'
7      printf "\n"
8  fi
```

sed source -> file in place

<p>Have you ever experienced that feeling when you walk into a room painted with cool colors that you seem to almost immediately feel <i>calmer</i> and more <i>relaxed</i>? This is no coincidence, because the tangible impact of color on the human psyche has been known for centuries. Color has long been used in a wide range of applications to affect and influence peoples' moods, and if fact, you have in all likelihood had your own mood deliberately and subliminally manipulated by third parties, even though you probably don't recognize this is happening.</p><p>One of the primary manipulators of color to affect mood is the advertising industry, that regularly employ this tactic to elicit specific emotional reactions from their audience to encourage positive buying behaviour. When colors are chosen correctly to this end, sales can be greatly increased, and when chosen poorly, can lead to poor sales and even an adverse reaction against the product being marketed.

i → in place



```
1  #!/bin/bash
2  if ! [ -f content.txt ] ; then
3      echo "No file to process."
4      exit 0
5  else
6      sed -i 's/<[^>]\+>//g' content.txt
7      printf "\n"
8  fi
```

sed source -> file to new file

<p>Have you ever experienced that feeling when you walk into a room painted with cool colors that you seem to almost immediately feel <i>calmer</i> and more <i>relaxed</i>? This is no coincidence, because the tangible impact of color on the human psyche has been known for centuries. Color has long been used in a wide range of applications to affect and influence peoples' moods, and in fact, you have in all likelihood had your own mood deliberately and subliminally manipulated by third parties, even though you probably don't recognize this is happening.</p><p>One of the primary manipulators of color to affect mood is the advertising industry, that regularly employ this tactic to elicit specific emotional reactions from their audience to encourage positive buying behavior. When colors are chosen correctly to this end, sales can be greatly increased, and when chosen poorly, can lead to poor sales and even an adverse reaction against the product being marketed.</p>



vbrown@LAPTOP-N6EFE714:~/CSP2101/

Have you ever experienced that feeling when you walk into a room painted with cool colors that you seem to almost immediately feel calmer and more relaxed? This is no coincidence, because the tangible impact of color on the human psyche has been known for centuries. Color has long been used in a wide range of applications to affect and influence peoples' moods, and in fact, you have in all likelihood had your own mood deliberately and subliminally manipulated by third parties, even though you probably don't recognize this is happening.

One of the primary manipulators of color to affect mood is the advertising industry, that regularly employ this tactic to elicit specific emotional reactions from their audience to encourage positive buying behaviour. When colors are chosen correctly to this end, sales can be greatly increased, and when chosen poorly, can lead to poor sales and even an adverse reaction against the product being marketed.

```
1  #!/bin/bash
2  if ! [ -f content.txt ] ; then
3      echo "No file to process."
4      exit 0
5  else
6      sed 's/<[^>]\+>//g' content.txt > content_f.txt
7  fi
```

sed,
.</p>


sed

Using Alternate Delimiters

Alt delimiters for special cases

```
1 Perspiciatis unde omnis iste natus error sit voluptatem accusantium doloremque
2 laudantium, totam rem aperiam, http://oldwebsite.com/files/pdf/ ipsa quae ab
3 illo inventore veritatis et quasi architecto beatae vitae dicta sunt explicabo.
4 Nemo enim ipsam voluptatem quia voluptas sit aspernatur aut odit aut fugit
5 sed quia consequuntur magni dolores eos qui http://oldwebsite.com/files/pdf/
6 voluptatem sequi nesciunt. Neque porro quisquam est, qui dolorem ipsum quia dolor
7 sit amet, consectetur, adipisci velit, sed quia non numquam eius modi tempora
8 incidunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim ad minima
9 veniam, http://oldwebsite.com/files/pdf/ nostrum exercitationem ullam corporis
```

```
1 #!/bin/bash
2
3 if [ -f newurls.txt ] ; then
4     rm newurls.txt
5 fi
6
7 sed -e 's%http://oldwebsite.com/files/pdf/%https://newwebsite.com/docs/pdf/%g' oldurls.txt > newurls.txt
```



```
illo inventore veritatis et quasi architecto beatae vitae dicta sunt explicabo.
Nemo enim ipsam voluptatem quia voluptas sit aspernatur aut odit aut fugit
sed quia consequuntur magni dolores eos qui https://newwebsite.com/docs/pdf/
voluptatem sequi nesciunt. Neque porro quisquam est, qui dolorem ipsum quia dolor
sit amet, consectetur, adipisci velit, sed quia non numquam eius modi tempora
incidunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim ad minima
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suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur? Quis autem vel eum
iure https://newwebsite.com/docs/pdf/.
```

Single pattern -> multiple line changes

```
1 Staff_No,Fname,Lname,Units,Status,PayLevel
2 453218,John,Brown,Completed,Probation,LevelA
3 453288,Jane,Smith,Completed,Probation,LevelA
4 453302,Tegan,Jones,In Progress,Probation,LevelA
5 453353,Mike,Buswell,Completed,Probation,LevelA
6 453395,Peter,Atwell,In Progress,Probation,LevelA
7 453437,Michelle,Edwards,Completed,Probation,LevelA
8 453479,John,Conner,In Progress,Probation,LevelA
9 453521,Mitchell,Moore,In Progress,Probation,LevelA
10 453563,Roy,McKnight,In Progress,Probation,LevelA
11 453605,Tanya,Williams,Completed,Probation,LevelA
```

```
1 #!/bin/bash
2
3 if [ -f staff_u.csv ] ; then
4     rm staff_u.csv
5 fi
6
7 sed '/Completed/ {
8     s/Probation/Qualified/g
9     s/LevelA/LevelB/g
10 }' staff.csv
11
12 printf "\n\n"
```



```
e,Lname,Units,Status,PayLevel
rown,Completed,Qualified,LevelB
mith,Completed,Qualified,LevelB
Jones,In Progress,Probation,LevelA
uswell,Completed,Qualified,LevelB
Atwell,In Progress,Probation,LevelA
le,Edwards,Completed,Qualified,LevelB
onner,In Progress,Probation,LevelA
453521,Mitchell,Moore,In Progress,Probation,LevelA
453563,Roy,McKnight,In Progress,Probation,LevelA
453605,Tanya,Williams,Completed,Qualified,LevelB
```


Delete specific line(s) by number

```
Staff_No,Fname,Lname,Units,Status,PayLevel
453218,John,Brown,Completed,Probation,LevelA
453288,Jane,Smith,Completed,Probation,LevelA
453302,Tegan,Jones,In Progress,Probation,LevelA
453353,Mike,Buswell,Completed,Probation,LevelA
453395,Peter,Atwell,In Progress,Probation,LevelA
453437,Michelle,Edwards,Completed,Probation,LevelA
453479,Jogn,Conner,In Progress,Probation,LevelA
453521,Mitchell,Moore,In Progress,Probation,LevelA
453563,Roy,McKnight,In Progress,Probation,LevelA
453605,Tanya,Williams,Completed,Probation,LevelA
```

- Removes the header line from the output file



```
1  #!/bin/bash
2
3  if [ -f staff_u.csv ] ; then
4      rm staff_u.csv
5  fi
6
7  sed '1d' staff.csv > staff_u.csv
8  cat staff_u.csv
9
10 printf "\n\n"
```

```
453218,John,Brown,Completed,Probation,LevelA
453288,Jane,Smith,Completed,Probation,LevelA
453302,Tegan,Jones,In Progress,Probation,LevelA
453353,Mike,Buswell,Completed,Probation,LevelA
453395,Peter,Atwell,In Progress,Probation,LevelA
453437,Michelle,Edwards,Completed,Probation,LevelA
453479,Jogn,Conner,In Progress,Probation,LevelA
453521,Mitchell,Moore,In Progress,Probation,LevelA
453563,Roy,McKnight,In Progress,Probation,LevelA
453605,Tanya,Williams,Completed,Probation,LevelA
```


Delete line(s) based on patten

```
Staff_No,Fname,Lname,Units,Status,PayLevel
453218,John,Brown,Completed,Probation,LevelA
453288,Jane,Smith,Completed,Probation,LevelA
453302,Tegan,Jones,In Progress,Probation,LevelA
453353,Mike,Buswell,Completed,Probation,LevelA
453395,Peter,Atwell,In Progress,Probation,LevelA
453437,Michelle,Edwards,Completed,Probation,LevelA
453479,Jogn,Conner,In Progress,Probation,LevelA
453521,Mitchell,Moore,In Progress,Probation,LevelA
453563,Roy,McKnight,In Progress,Probation,LevelA
453605,Tanya,Williams,Completed,Probation,LevelA
```

- Removes Peter Atwell's record from the output file



```
1  #!/bin/bash
2
3  if [ -f staff_u.csv ] ; then
4      rm staff_u.csv
5  fi
6
7  sed '/Atwell/d' staff.csv > staff_u.csv
8  cat staff_u.csv
9
10 printf "\n\n"
```



```
Staff_No,Fname,Lname,Units,Status,PayLevel
453218,John,Brown,Completed,Probation,LevelA
453288,Jane,Smith,Completed,Probation,LevelA
453302,Tegan,Jones,In Progress,Probation,LevelA
453353,Mike,Buswell,Completed,Probation,LevelA
453437,Michelle,Edwards,Completed,Probation,LevelA
453479,Jogn,Conner,In Progress,Probation,LevelA
453521,Mitchell,Moore,In Progress,Probation,LevelA
453563,Roy,McKnight,In Progress,Probation,LevelA
453605,Tanya,Williams,Completed,Probation,LevelA
```

sed

Multiple Commands

Multiple arguments -> method 1

```
1  #!/bin/bash
2
3  if [ -f posttext.txt ] ; then
4      rm posttext.txt
5  fi
6
7  sed -e 's/<\p[^>]*>/\n\n/g; s/<[^>]\+>//g; s/color/colour/g; s/Color/Colour/g; s/recognize/
    recognise/g; s/Recognize/Recognise/g' pretext.txt > posttext.txt
8
9  exit 0
```

- -e means read multiple commands
- Separate each regex with a semi colon (;)
- Only one set of quotes required

OUTPUT TERMINAL DEBUG CONSOLE PROBLEMS

1: bash

vbrown@LAPTOP-N6EFE714: ~/CSI6203/workshop/week \$ cat posttext.txt

Have you ever experienced that feeling when you walk into a room painted with cool colours that you seem to almost immediately feel calmer and more relaxed? This is no coincidence, because the tangible impact of colour on the human psyche has been known for centuries. Colour has long been used in a wide range of applications to affect and influence peoples' moods, and if fact, you have in all likelihood had your own mood deliberately and subliminally manipulated by third parties, even though you probably don't recognise this is happening.

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Multiple arguments -> method 2

```
1  #!/bin/bash
2
3  if [ -f posttext.txt ] ; then
4      rm posttext.txt
5  fi
6
7  sed -e 's/<\p[^>]*>/\n\n/g'\
8      -e 's/<[^>]\+>//g'\
9      -e 's/color/colour/g'\
10     -e 's/Color/Colour/g'\
11     -e 's/recognize/recognise/g'\
12     -e 's/Recognize/Recognise/g' pretext.txt > posttext.txt
13
14  exit 0
```

OVER MULTIPLE LINES FOR READABILITY

- Each argument needs its own -e
- Each argument requires open/close quotes
- Backslashes (\) used to run command across multiple lines

OUTPUT TERMINAL DEBUG CONSOLE PROBLEMS

```
vbrown@LAPTOP-N6EFE714 ~/CSI6203/workshop/week $ ./sed4.sh
vbrown@LAPTOP-N6EFE714 ~/CSI6203/workshop/week $ cat posttext.txt
```

Have you ever experienced that feeling when you walk into a room painted with cool colours that you seem to almost immediately feel a coincidence, because the tangible impact of colour on the human psyche has been known for centuries. Colour has long been used to affect and influence peoples' moods, and in fact, you have in all likelihood had your own mood deliberately and subliminally manipulated. You probably don't recognise this is happening.

One of the primary manipulators of colour to affect mood is the advertising industry, that regularly employ this tactic to affect their audience to encourage positive buying behaviour. When colours are chosen correctly to this end, sales can be greatly increased.

References and Further Reading

- Ebrahim, M. & Mallet, A. (2018). *Mastering Linux Based Scripting*. (2nd Ed), Chapter 8, pp 141-160
- <http://www.gnu.org/software/sed/manual/sed.html>
- <http://linux.die.net/man/1/sed>
- <https://www.cyberciti.biz/faq/how-to-use-sed-to-find-and-replace-text-in-files-in-linux-unix-shell/>