Linux 操作系统及应用 附录 B — sed: Stream EDitor

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内容简介 Ⅲ

- 退出命令 q
- ❶ 缓冲区操作命令 h,G,g,x



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sed概述 I

- 流是具有特殊属性的动态序列元素。流中所有的元素都具有相同的数据类型。流中元素的个数被称为流的长度。对流可以进行读写操作。
- sed的基本语法为:

```
1 sed [-n] [-e] 'edit_cmds' in_file或:
2 sed [-n] -f edit_script in_file
```

- 其中in_file表示要被编辑的输入流,缺省时指标准输入
- -n选项表示隐藏所有输出
- -e选项指明后续的是一个编辑命令,编辑命令的语法为:

```
1 [addr1[,addr2]]function [args]
```

• addr指明操作的行范围, function是命令, args是命令的参数



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sed概述 II

- sed每次处理输入文件(或标准输入)的一行,并把结果送到标准输出上。sed把当前正在处理的行保存在一个临时缓冲区中,这个临时缓冲区被称为模式空间(pattern space)。
- 一旦sed完成了对模式空间里的行的处理,就把模式空间中的内容 送到标准输出上(除非该命令要删除该行或禁止打印)。处理完该 行后,从模式空间中删除它,然后读入下一行继续处理。





sed概述 III

• 实验数据文件:

```
[Apple] $ cat data
   northwest
               NW
                    Charles Main
                                         3.0
                                               .98
                                                       34
   western
               WE
                    Sharon Gray
                                         5.3
                                               .97 5
                                                       23
                    Levis Dalsass
                                         2.7
   southwest
               SW
                                               . 8
                                                       18
5
   southern
               SO
                    Suan Chin
                                         5.1
                                               .95
                                                       15
   southeast
               SE
                                         4.0
                                               .7
                                                       17
                    Patricia Hemenway
               ΕA
                    TB Savage
                                         4.4
                                               .84
                                                    5
                                                       20
   eastern
8
   northeast
               NE
                    MA
                       Main Jr.
                                         5.1
                                               .94
                                                       13
9
               NO
                    Margot Weber
                                         4.5
                                               .89
                                                    5
                                                       9
   north
10
               CT
                    Ann Stephens
                                                    5
                                                       13
   central
                                         5.7
                                               .94
```





打印命令pl

```
1
    [Apple] $ sed '/north/p'
                               data
   northwest
                NW
                                                          34
                     Charles Main
                                           3.0
                                                 .98
                                                       3
                                                          34
   northwest
                NW
                     Charles Main
                                           3.0
                                                 .98
                WE
                                                       5
                                                          23
   western
                     Sharon Gray
                                           5.3
                                                 .97
   southwest
                SW
                     Levis Dalsass
                                           2.7
                                                 . 8
                                                          18
6
                SO
                                                          15
   southern
                     Suan Chin
                                           5.1
                                                 .95
                SE
                                                 . 7
                                                          17
   southeast
                     Patricia Hemenway
                                           4.0
8
                EΑ
                       Savage
                                           4.4
                                                 .84
                                                       5
                                                          20
   eastern
                     TB
9
                ΝE
                        Main Jr.
                                           5.1
                                                 .94
                                                          13
   northeast
                     AM
10
   northeast
                NE
                     ΑM
                        Main Jr.
                                           5.1
                                                 .94
                                                       3
                                                          13
11
   north
                NO
                     Margot Weber
                                           4.5
                                                 .89
                                                       5
                                                          9
12
                                                          9
   north
                NO
                     Margot Weber
                                           4.5
                                                 .89
                                                       5
13
   central
                CT
                     Ann Stephens
                                           5.7
                                                 .94
                                                       5
                                                          13
```





打印命令p II

- p命令打印匹配的行
- sed的默认动作是输出模式空间中的行





禁止选项-n I

Example:

```
[Apple] $ sed -n '/north/p' data
northwest
           NW
              Charles Main
                                  3.0
                                        .98
                                                34
           NE
                                  5.1
                                        .94 3 13
northeast
              AM Main Jr.
                                  4.5
                                             5
                                                9
north
           NO
               Margot Weber
                                        .89
```

Explain

■ -n选项和p命令一起使用时将禁止sed的默认行为:输出模式空间中的行,因此只有匹配的行被输出。





删除命令dI

Example:

```
[Apple] $ sed '3d'
                       data
  northwest
                   Charles Main
               NW
                                         3.0
                                               .98
                                                        34
                                                    5
  western
               WE
                   Sharon Gray
                                         5.3
                                               .97
                                                        23
               SO
                   Suan Chin
                                         5.1
                                                        15
  southern
                                               .95
  southeast
               SE
                   Patricia Hemenway
                                         4.0
                                               . 7
                                                        17
6
               ΕA
                                         4.4
                                                    5
                                                        20
  eastern
                   TB Savage
                                               .84
               NE
                      Main Jr.
                                         5.1
                                               .94
                                                        13
  northeast
8
               NO
                                               .89
                                                    5
                                                        9
  north
                   Margot Weber
                                         4.5
9
               CT
                                                     5
                                                        13
  central
                   Ann Stephens
                                         5.7
                                               .94
```

Explain

■ 删除第三行,对其它的行执行sed的默认动作。

←□▶ ←□▶ ←□▶ ←□▶ □ ♥ ♀ ♀ ♀ ○

删除命令dII

Example:

```
1 [Apple] $ sed '3, $d' data
2 northwest NW Charles Main 3.0 .98 3 34
3 western WE Sharon Gray 5.3 .97 5 23
```

Explain

■ 删除第三行至最后一行之间的所有行,对其它的行执行sed的默认动作。





删除命令d III

Example:

```
[Apple] $ sed '$d'
                     data
  northwest
              NW
                  Charles Main
                                       3.0
                                            .98
                                                    34
  western
              WE
                  Sharon Gray
                                       5.3
                                            .97 5
                                                    23
                  Levis Dalsass
  southwest
              SW
                                       2.7
                                            . 8
                                                    18
5
  southern
              SO
                  Suan Chin
                                       5.1
                                            .95
                                                     15
              SE
                  Patricia Hemenway
                                       4.0
                                            .7
                                                     17
  southeast
              EΑ
                  TB Savage
                                       4.4
                                            .84
                                                 5
                                                    20
  eastern
8
  northeast
              NE
                  AM Main Jr.
                                       5.1
                                            .94
                                                    13
              NO
                                       4.5
                                                  5
                                                     9
  north
                  Margot Weber
                                            .89
```

Explain

■ 删除最后一行,对其它的行执行sed的默认动作。



删除命令d IV

Example:

```
[Apple] $ sed '/north/d' data
  western
             WE
                 Sharon Gray
                                    5.3
                                         .97
                                                 23
  southwest
             SW
                 Levis Dalsass
                                    2.7
                                         .8 2
                                                 18
                                    5.1
  southern
             SO
                Suan Chin
                                         .95
                                                15
5
  southeast
             SE
                Patricia Hemenway
                                    4.0
                                         . 7
                                                17
                                         .84 5 20
             EΑ
                                    4.4
  eastern
                 TB Savage
             CT
                 Ann Stephens
                                    5.7
                                                 13
  central
                                         .94
```

Explain

■ 删除匹配 north 的行,对其它的行执行sed的默认动作。





替换命令sl

```
1
   [Apple] $ sed 's/west/north/g'
                                     data
   northnorth NW
                   Charles Main
                                          3.0
                                               .98
                                                        34
   northern
                WE
                    Sharon Gray
                                         5.3
                                               .97
                                                        23
   southnorth
                    Levis Dalsass
                                                        18
               SW
                                         2.7
                                               .8
   southern
                SO
                    Suan Chin
                                         5.1
                                               .95
                                                        15
6
                                               .7
                                                        17
   southeast
                SE
                    Patricia Hemenway
                                         4.0
                                                     4
                EΑ
                    TB Savage
                                         4.4
                                                     5
                                                        20
   eastern
                                               .84
8
                NE
                       Main Jr.
                                         5.1
                                                     3
                                                        13
   northeast
                    ΑM
                                               .94
9
                                               .89
                                                     5
                                                        9
   north
                NO
                    Margot Weber
                                         4.5
10
                    Ann Stephens
   central
                CT
                                          5.7
                                               .94
                                                     5
                                                        13
```





替换命令sII

- 将每一行中出现的所有 west 都替换为 north,并输出(缺省动作)
- g选项表示行全程:对单行中的每一个实例都执行操作





替换命令s III

Example:

```
1 [Apple] $ sed -n 's/^west/north/p' data
2 northern WE Sharon Gray 5.3 .97 5 23
```

Explain

■ s命令将所有行首出现的 west 都替换为 north,-n和p命令表示只输出替换过的行。





替换命令s IV

```
[Apple] \$ sed 's/[0-9][0-9]\$/\&.5/'
                                          data
   northwest
                NW
                    Charles Main
                                         3.0
                                                .98
                                                        34.5
   western
                WE
                    Sharon Gray
                                          5.3
                                               .97
                                                     5
                                                        23.5
                    Levis Dalsass
                                         2.7
   southwest
               SW
                                               .8
                                                        18.5
5
   southern
                SO
                    Suan Chin
                                         5.1
                                               .95
                                                        15.5
                SE
   southeast
                    Patricia Hemenway
                                         4.0
                                               .7
                                                     4
                                                        17.5
                EΑ
                                          4.4
                                                     5
                                                        20.5
   eastern
                    TB Savage
                                               .84
8
   northeast
                NE
                    AM
                       Main Jr.
                                         5.1
                                               .94
                                                     3
                                                        13.5
                NO
                                                     5
                                                        9
   north
                    Margot Weber
                                         4.5
                                               .89
10
                CT
                    Ann Stephens
                                                     5
                                                        13.5
   central
                                          5.7
                                                .94
```





替换命令s V

- 所有以两个数字结尾的行都会在后面加上.5
- 搜索串[0-9][0-9]\$表示行尾最后两个字符是数字字符
- 替换串中的&表示在搜索串里真正找到的串





替换命令s VI

Example:

```
1 [Apple] $ sed -n 's/\(Mar\)got/\1ianne/p' data
2 north NO Marianne Weber 4.5 .89 5 9
```

- 用 Marianne 来替换每行中的第一个 Margot,并输出替换过的行
- \(和\)用于表示标记正则表达式,而\n,(n = 1, 2, ..., 9)表示对标记正则表达式的引用





替换命令s VII

```
[Apple] $ sed 's#3#88#q'
   northwest
               NW
                    Charles Main
                                         88.0
                                               .98
                                                    88
                                                       884
   western
               WE
                    Sharon Gray
                                         5.88
                                               .97
                                                    5
                                                       288
   southwest
               SW
                    Levis Dalsass
                                         2.7
                                               .8
                                                       18
5
   southern
               SO
                    Suan Chin
                                         5.1
                                               .95
                                                       15
               SE
                                               .7
                                                       17
   southeast
                    Patricia Hemenway
                                         4.0
                EΑ
                                         4.4
                                                    5
                                                       20
   eastern
                    TB Savage
                                               .84
8
   northeast
               NE
                    AM
                       Main Jr.
                                         5.1
                                               .94
                                                    88
                                                       188
9
               NO
                    Margot Weber
                                                    5
                                                       9
   north
                                         4.5
                                               .89
10
               CT
                    Ann Stephens
                                                    5
                                                        188
   central
                                         5.7
                                               .94
```





替换命令s VIII

- 所有的字符 3 用 88 这两个字符来替换
- s命令后紧跟着的字符被视为搜索串和替换串的定界符,可任 意指定





模式范围I

Example:

```
1
  [Apple] $ sed -n '/west/,/east/p'
                                   data
  northwest
                 Charles Main
             NW
                                    3.0
                                         .98
                                                 34
                                    5.3
                                              5
                                                 23
  western
             WE
                 Sharon Gray
                                         .97
  southwest
             SW
                                    2.7
                                         .8 2 18
                Levis Dalsass
  southern
             SO
               Suan Chin
                                    5.1
                                         .95 4 15
             SE Patricia Hemenway
                                    4.0
                                                 17
  southeast
                                         .7
                                              4
```

- 输出在 west 和 east 两个模式之间的所有行。包括这个范围的首、 尾行
- 如果 west 出现在 east 之后,则输出从 west 到下一个 east 或文件 结尾之间的所有行

模式范围 ||

Example:

```
1 [Apple]$ sed -n '5,/^northeast/p' data
2 southeast SE Patricia Hemenway 4.0 .7 4 17
3 eastern EA TB Savage 4.4 .84 5 20
4 northeast NE AM Main Jr. 5.1 .94 3 13
```

Explain

• 输出从第 5 行到以 northeast 开头的第一个行之间的所有行





模式范围 III

```
[Apple] $ sed '/west/,/east/s/$/**VACA**/' data
   northwest NW Charles Main
                              3.0 .98 3 34**VACA**
   western
            WE Sharon Gray
                              5.3 .97 5 23**VACA**
   southwest SW Levis Dalsass
                                 2.7 .8 2 18**VACA**
5
   southern SO Suan Chin
                                 5.1 .95 4 15**VACA**
   southeast SE Patricia Hemenway 4.0 .7
                                         4 17**VACA**
   eastern
            EA TB Savage
                                 4.4 .84 5 20
8
   northeast NE
               AM Main Jr.
                              5.1 .94 3 13
            NO
   north
               Margot Weber
                                 4.5 .89 5 9
10
               Ann Stephens
                                 5.7 .94 5 13
   central
            CT
```





模式范围 IV

Explain

■ 对于在 west 和 east 两个模式之间的所有行,在其行尾添加 串**VACA**





编辑选项-el

Example:

```
[Apple] $ sed -e '1,3d' -e 's/Hemenway/Jones/'
                                             data
  southern
            SO
               Suan Chin
                                  5.1
                                       . 95
                                              15
  southeast
            SE
               Patricia Jones
                                  4.0 .7 4 17
            EA TB Savage
                               4.4 .84 5 20
  eastern
                             5.1
                                       .94 3 13
  northeast
            NF.
               AM Main Jr.
6
  north
            NO
               Margot Weber
                                  4.5 .89 5 9
            CT
                Ann Stephens
                                  5.7
                                       .94 5
                                              13
  central
```

- -e选项表示要进行多次编辑:
- 第一次编辑删除 1-3 行;
- 第二次编辑用 Jones 替换 Hemenway。

读文件命令rl

```
[Apple] $ cat notice
3
         *** SUAN HAS LEFT THE COMPANY ***
5
6
   [Apple] $ sed '/Suan/r notice' data
8
   northwest NW
                Charles Main
                                  3.0
                                        .98 3 34
9
   western WE Sharon Gray
                                 5.3 .97 5 23
10
                                 2.7 .8 2 18
   southwest SW
                Levis Dalsass
11
   southern SO Suan Chin
                                  5.1
                                        .95
                                                15
12
13
14
            SUAN HAS LEFT THE COMPANY ***
```

读文件命令rII

15					- 1			
16								
17	southeast	SE	Patricia Hemenway	4.0	.7	4	17	
18	eastern	ΕA	TB Savage	4.4	.84	5	20	
19	northeast	NE	AM Main Jr.	5.1	.94	3	13	
20	north	NO	Margot Weber	4.5	.89	5	9	
21	central	CT	Ann Stephens	5.7	.94	5	13	

Explain

■ r命令用于读入文件,并将其内容显示在所有匹配行的后面





写文件命令wl

Example:

```
[Apple] $ sed -n '/north/w newfile' data
[Apple] $ cat newfile
northwest NW
             Charles Main
                                  3.0
                                       .98
                                               34
             AM Main Jr.
                                  5.1
                                       .94 3 13
northeast NE
north
          NO
             Margot Weber
                                  4.5
                                       .89 5
                                               9
```

Explain

■ w命令用于写文件,将所有本应送到STDOUT上的内容都写到指定的 文件中





追加命令a I

```
1
    [Apple] $ sed '/^north /a\
   >-->THE NORTH
                   SALES DISTRICT HAS
                                        MOVED <--'
                                                   data
               NW
   northwest
                    Charles Main
                                         3.0
                                               .98
                                                    3
                                                       34
                                                       23
   western
               WE
                    Sharon Gray
                                         5.3
                                               .97
                                                    5
   southwest
               SW
                    Levis Dalsass
                                         2.7
                                               . 8
                                                       18
6
               SO
                                                       15
   southern
                    Suan Chin
                                         5.1
                                               .95
               SE
                  Patricia Hemenway
                                         4.0
                                               .7
                                                       17
   southeast
8
               ΕA
                    TB Savage
                                         4.4
                                               .84
                                                    5
                                                       20
   eastern
9
               NE
                       Main Jr.
                                         5.1
                                               .94
                                                       13
   northeast
                    AM
10
   north
               NO
                    Margot Weber
                                         4.5
                                               .89
                                                       9
11
   -->THE NORTH SALES DISTRICT HAS
                                       MOVED <--
12
               CT
                                         5.7
                                                    5
                                                        13
   central
                    Ann Stephens
                                               . 94
```



追加命令aⅡ

- a命令用添加文本到当前行的后面
- 模式中 north 后面的空格用于区别 north 和 northeast、northwest
- 第一行行尾的\用于续行
- 第二行行首的>是 Bourne Shell 的缺省PS2





插入命令il

```
[Apple] $ sed '/eastern/i\
   > NEW ENGLAND REGION\
3
                                           data
   northwest
                Charles Main
              NW
                                     3.0
                                          .98
                                                 34
   western
              WE
                Sharon Gray
                                     5.3
                                          .97 5
                                                 23
              SW
                                 2.7 .8 2 18
   southwest
                Levis Dalsass
              SO
                Suan Chin
                                  5.1
                                          .95 4 15
   southern
   southeast SE Patricia Hemenway
                                     4.0
                                          . 7
                                                 17
9
   NEW ENGLAND REGION
10
11
   eastern
              EΑ
                  TB Savage
                                     4.4
                                          . 84
                                               5
                                                 20
12
   northeast
              NF.
                    Main Jr.
                                     5.1
                                          .94 3
                                                 13
                  AM
13
                                          .89 5
                                                 9
   north
              NO
                  Margot Weber
                                     4.5
14
                                               5
                                                 13
   central
              CT
                  Ann Stephens
                                     5.7
                                          .94
```

插入命令ill

- i命令用插入文本到当前行的前面
- 第一行和第二行行尾的\用于续行
- 第二行和第三行行首的>是 Bourne Shell 的缺省PS2





读文本命令nl

```
1
   [Apple] $ sed '/eastern/{n;s/AM/Archie/;}' data
   northwest
               NW
                    Charles Main
                                         3.0
                                               .98
                                                    3
                                                       34
   western
               WE
                    Sharon Gray
                                         5.3
                                               .97
                                                       23
                    Levis Dalsass
                                         2.7
                                                       18
   southwest
               SW
                                               . 8
   southern
               SO
                    Suan Chin
                                         5.1
                                               .95
                                                       15
6
               SE
                                         4.0
                                               .7
                                                       17
   southeast
                    Patricia Hemenway
                                                    4
               EΑ
                                         4.4
                                                    5
   eastern
                    TB Savage
                                               .84
                                                       20
8
               NE
                    Archie Main Jr.
                                         5.1
                                                    3
                                                       13
   northeast
                                               .94
9
                    Margot Weber
                                                    5
                                                       9
   north
               NO
                                         4.5
                                               .89
                    Ann Stephens
10
   central
               CT
                                         5.7
                                               .94
                                                    5
                                                       13
```





读文本命令n II

- n命令用将当前行的下一行的内容读入到模式空间
- { 和 } 用于将数个由;分隔的sed命令括起来,这些命令将统统在 当前的模式空间上执行一遍





字符集转换命令yl

```
1
   [Apple] $ sed '1,3y/abcdefghijklmnopqrstuvwxyz/\
             ABCDEFGHIJKLMNOPQRSTUVWXYZ/' data
3
   NORTHWEST
               NW
                   CHARLES MAIN
                                       3.0
                                             .98
                                                     34
   WESTERN
                                             .97 5
                                                     23
               WE
                   SHARON GRAY
                                       5.3
   SOUTHWEST
               SW
                  LEVIS DALSASS
                                       2.7
                                             . 8
                                                     18
               SO
                  Suan Chin
                                       5.1
                                                     15
   southern
                                             .95
               SE
                                       4.0
                                             . 7
                                                     17
   southeast
                  Patricia Hemenway
               EΑ
                                       4.4
                                             .84
                                                  5
                                                     20
   eastern
                   TB Savage
9
               NE
                      Main Jr.
                                       5.1
                                             .94
                                                     13
   northeast
                  ΑM
10
                                                     9
   north
               NO
                   Margot Weber
                                       4.5
                                             .89
11
   central
               CT
                   Ann Stephens
                                       5.7
                                             .94
                                                     13
12
   [Apple]$ sed '1,3y/[a-z]/[A-Z]/'
                                      data
13
   northwest
               NW
                   Charles Main
                                       3.0
                                             .98
                                                  3
                                                     34
14
                                                     23
   western
               WE
                   ShAron GrAy
                                       5.3
                                             .97
                                                  5
```

字符集转换命令yII

```
15
   southwest
                SW
                    Levis DAlsAss
                                         2.7
                                               . 8
                                                        18
16
   southern
                SO
                    Suan Chin
                                          5.1
                                               .95
                                                        15
17
   southeast
                SE
                    Patricia Hemenway
                                         4.0
                                               .7
                                                       17
18
                                         4.4
                                                    5
   eastern
                EΑ
                    TB Savage
                                               .84
                                                        20
19
                                         5.1
                                                        13
   northeast
                NF.
                    AM Main Jr.
                                               .94
20
                                               .89 5
                                                        9
   north
                NO
                    Margot Weber
                                         4.5
21
                CT
                    Ann Stephens
                                                     5
                                                        13
   central
                                         5.7
                                               .94
```

- y命令类似于 shell 中的tr命令,用于将一个字符集中的字符替换为 另一个字符集中相应位置上的字符
- y命令无法识别正则表达式的元字符





退出命令qI

```
1
   [Apple] $ sed '5q' data
   northwest
             NW
                Charles Main
                                    3.0
                                          .98
                                                 34
                                          .97 5 23
   western
              WE
                Sharon Gray
                                    5.3
   southwest
                                    2.7 .8 2 18
              SW
                Levis Dalsass
   southern
              SO
                Suan Chin
                                    5.1
                                          .95 4 15
6
              SE
                                    4.0 .7
                                                  17
   southeast
                Patricia Hemenway
   [Apple]$ sed '/Levis/{s/Levis/Joseph/;q;}'
                                             data
8
   northwest
              NW
                  Charles Main
                                    3.0
                                          .98
                                              3
                                                 34
9
                                    5.3
                                          .97 5 23
   western
              WE
                Sharon Gray
10
   southwest
              SW
                  Joseph Dalsass
                                    2.7
                                          . 8
                                                 18
```





退出命令qII

Explain

• q命令将终止sed的运行



缓冲区操作命令h,G,g,x I

```
[Apple] $ sed -e '/northeast/h' -e '$G'
                                             data
   northwest
               NW
                   Charles Main
                                       3.0
                                             .98
                                                     34
                                       5.3
   western
               WE
                   Sharon Gray
                                             .97
                                                     23
               SW
                   Levis Dalsass
                                       2.7
                                                     18
   southwest
                                             . 8
   southern
               SO
                  Suan Chin
                                       5.1
                                             .95
                                                     15
6
               SE
                                       4.0
                                             . 7
                                                     17
   southeast
                  Patricia Hemenway
               EΑ
                                       4.4
                                                     20
   eastern
                   TB Savage
                                             .84
8
               NE
                   AM Main Jr.
                                       5.1
                                             .94
                                                     13
   northeast
9
               NO
                   Margot Weber
                                       4.5
                                             .89
                                                  5
                                                     9
   north
10
                   Ann Stephens
   central
               CT
                                       5.7
                                             .94
                                                     13
11
   northeast
               NE
                   AM Main Jr.
                                       5.1
                                             .94
                                                     13
12
   [Apple] sed -e'/WE/\{h;d;\}'-e'/CT/\{g;\}'
                                                 data
13
   northwest
               NW
                   Charles Main
                                       3.0
                                             .98
                                                  3
                                                     34
14
   southwest
               SW
                   Levis Dalsass
                                       2.7
                                             . 8
                                                  2
                                                     18
```

缓冲区操作命令h,G,g,xⅡ

```
15
   southern
              SO
                   Suan Chin
                                      5.1
                                            .95
                                                    15
16
   southeast
              SE
                  Patricia Hemenway
                                      4.0
                                            .7
                                                    17
17
   eastern
              EΑ
                  TB Savage
                                      4.4
                                            .84
                                                 5
                                                    20
18
                                                    13
   northeast
              NE
                  AM Main Jr.
                                      5.1
                                            .94
                                                3
19
                                            .89 5
                                                    9
   north
              NO
                  Margot Weber
                                      4.5
20
              WE
                                                    23
   western
                   Sharon Gray
                                      5.3
                                            .97
21
            sed -e '/Patricia/h' -e \
   [Apple]$
22
             '/Margot/x' -e '$G' data
23
              NW
                  Charles Main
                                      3.0
   northwest
                                            .98
                                                    34
24
              WE
                                            .97 5
                                                    23
   western
                 Sharon Gray
                                      5.3
25
              SW
                  Levis Dalsass
                                      2.7
                                            .8
                                                    18
   southwest
26
              SO
                 Suan Chin
                                      5.1
                                                    15
   southern
                                            .95
27
   southeast
              SE
                  Patricia Hemenway
                                      4.0
                                            .7
                                                    17
28
              EΑ
                  TB Savage
                                      4.4
                                            .84
                                                5
                                                    20
   eastern
29
   northeast
              NE
                  AM Main Jr.
                                      5.1
                                            .94
                                                3
                                                    13
30
   southeast
              SE
                  Patricia Hemenway
                                      4.0
                                            .7
                                                 4
                                                    17
```



缓冲区操作命令h,G,g,x III

31	central	CT	Ann Stephens	5.7	.94	5	13
32	north	NO	Margot Weber	4.5	.89	5	9

- h命令将当前模式空间中的内容复制到另一个被称为<mark>保持缓冲区</mark> (holding buffer)的专用缓冲区中去
- G命令把保持缓冲区中的内容放到当前模式空间之后
- g命令把保持缓冲区中的内容放到当前模式空间中取代原模式空间中的内容
- ▼命令把保持缓冲区中的内容和当前模式空间中的内容交换一下





The End

The End of Appendix B.



