CSc 451, Spring 2003
Assignment 8
Due: Thursday, April 10 at 18:00

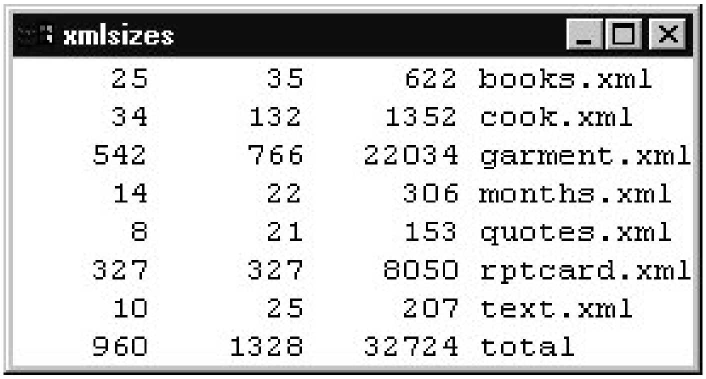
Problem 1. (20 points) `vals.icn`

In this problem you are to write a program named `vals` that performs simple calculations on the numbers, if any, contained in blocks of text indicated by the user.

`vals` operates on a text file that is named on the command line. As an example, consider a file named `xmlsizes` that happens to contain some `wc` output:

```
% cat xmlsizes
      25      35      622 books.xml
      34     132     1352 cook.xml
     542     766    22034 garment.xml
      14      22      306 months.xml
       8      21      153 quotes.xml
     327     327     8050 rptcard.xml
      10      25      207 text.xml
     960    1328    32724 total
%
```

The command "`vals xmlsizes`" produces this window:



```
      25      35      622 books.xml
      34     132     1352 cook.xml
     542     766    22034 garment.xml
      14      22      306 months.xml
       8      21      153 quotes.xml
     327     327     8050 rptcard.xml
      10      25      207 text.xml
     960    1328    32724 total
```

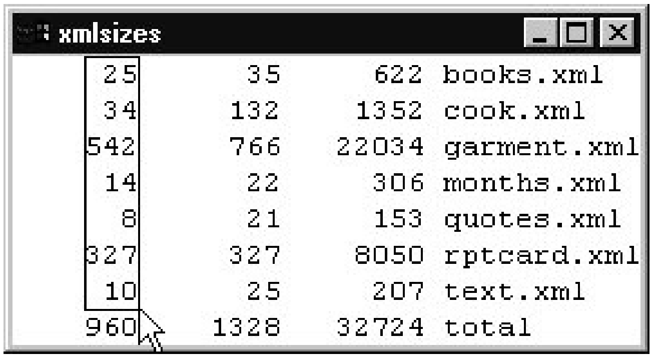
By default, the text is displayed in a 16-point `typewriter` font. The window is precisely sized based on the longest line and the number of lines.

The default point size can be overridden with the `-s` option:

```
vals -s 12 xmlsizes
```

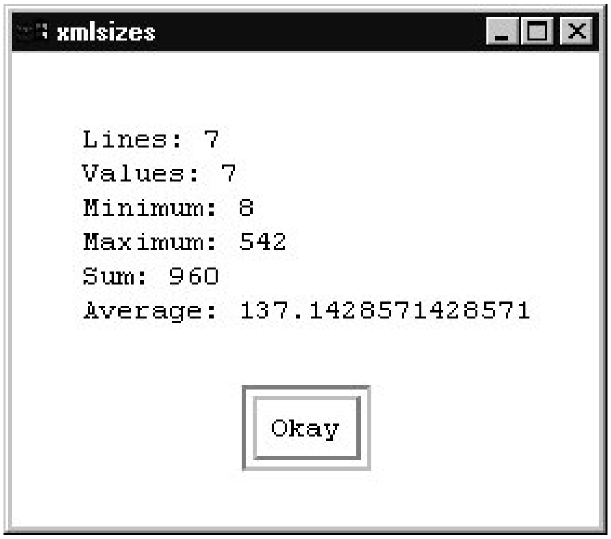
If present, `-s` *`size`* precedes the filename.

Using a left button click and drag the user sweeps out a rectangle of text that is of interest:



```
     25       35      622 books.xml
     34      132     1352 cook.xml
    542      766    22034 garment.xml
     14       22      306 months.xml
      8       21      153 quotes.xml
    327      327     8050 rptcard.xml
     10       25      207 text.xml
    960     1328    32724 total
```

The rectangle is rubberbanded and "snaps" to the character "cells". When the left button is released, a dialog box appears:



```
Lines: 7
Values: 7
Minimum: 8
Maximum: 542
Sum: 960
Average: 137.1428571428571
```

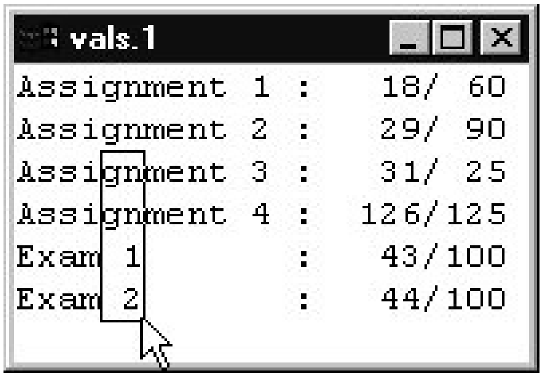
The dialog box shows that seven lines are in the selected region and that all seven lines contain a numeric value. The minimum, maximum, sum, and average are displayed as well. Note that minimal formatting is done—there is no horizontal alignment and the value displayed for the average is simply what Icon produces for `string(960/7.0)`.

The user may select as little as one character or the full window contents.

The dialog box is dismissed by clicking the `Okay` button. The rubberbanded rectangle then disappears and the user may make another selection.

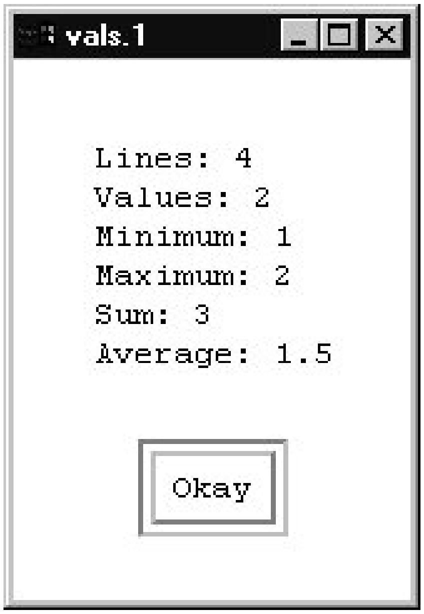
Typing a "`q`" exits `vals`.

Here is another example (`vals vals.1`):



```
Assignment 1 :   18/ 60
Assignment 2 :   29/ 90
Assignment 3 :   31/ 25
Assignment 4 :  126/125
Exam 1       :   43/100
Exam 2       :   44/100
```

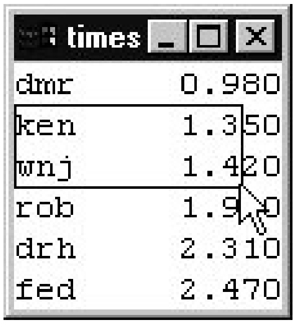
In this case four lines are selected but the text in two of them does not represent a numeric value. The values for minimum, et al. are computed based on only two values (1 and 2).



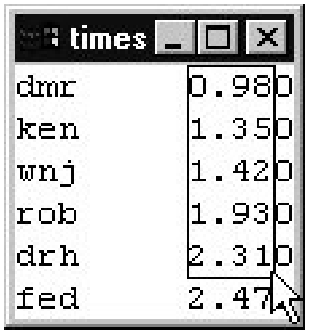
```
Lines: 4
Values: 2
Minimum: 1
Maximum: 2
Sum: 3
Average: 1.5
```

Note that because the file `vals.1` ends with a blank line there is a blank line at the bottom of the window. It also happens that one line has a space character following the rightmost digit and that produces the blank column on the right edge of the screen.

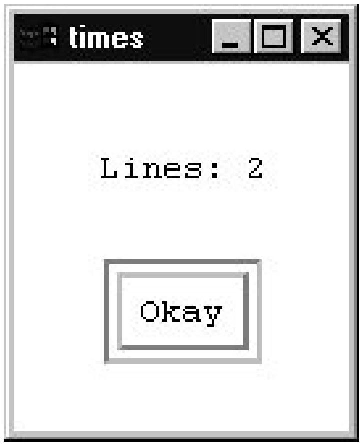
Here is a third example: (`vals times`)



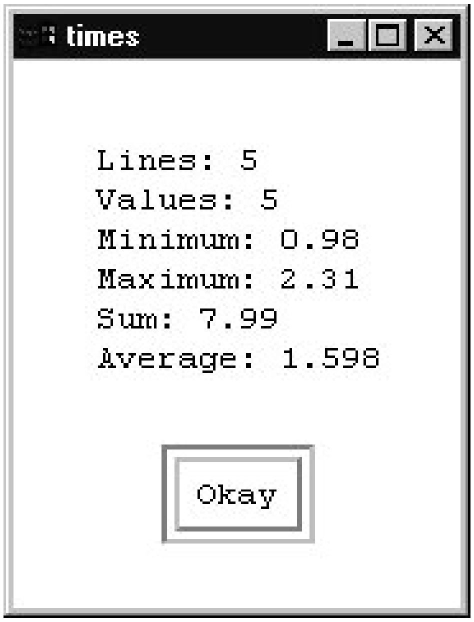
```
dmr          0.980
ken          1.350
wnj          1.420
rob          1.930
drh          2.310
fed          2.470
```



```
dmr          0.980
ken          1.350
wnj          1.420
rob          1.930
drh          2.310
fed          2.470
```



```
Lines: 2
```



```
Lines: 5
Values: 5
Minimum: 0.98
Maximum: 2.31
Sum: 7.99
Average: 1.598
```

Neither line in the left hand example's selection has a numeric value; all that is reported is that there are two lines in the selection.

In the right hand example the values contain a decimal point and therefore the calculated values are shown as real numbers.

Here are some good ways to simplify the problem:

> Assume that the user will drag out the rectangle with an upper-left to lower-right motion.
>
> Assume that there are no tab characters in the input.
>
> Don't worry about checking command line arguments for validity.
>
> Don't worry about the possibility of there being insufficient screen space to display all the text. Assume it will fit.
>
> Don't worry about precisely matching the behavior of the reference version when

sweeping out the selection. All that's important is that the selection box grow (or shrink) in increments of the character width and/or height and that there's no ambiguity about which characters are selected.

Don't worry about the case of dragging the pointer outside of the window and then releasing the button.

Implementation Notes

To determine if the text of a line of the selection represents a value, call the `numeric()` function with that text. If `numeric()` succeeds, it is a value. By this rule text such as "`x 10`", "`3  7`", and "`7 x`" does NOT represent a value. Use the value produced by `numeric()` in the subsequent computations.

Use the `Notice(s1, s2, ..., sn)` procedure to produce the dialog box. Here is a trivial program that uses `Notice()`:

```
link graphics, split
procedure main()
    WOpen("rows=30","cols=60")
    while line := WRead() do
        Notice!split(line)
end
```

When the dialog is dismissed with the `Okay` button, `Notice()` returns.

Hint: Avoid tricky failure situations by using `left()` to pad all input lines to the length of the longest line.

Problem 2. (10 points) `amuse.icn`

In this problem you are to write a small program of your design that does something "interesting". It may use random numbers, text, color, event handling, or whatever you wish. A program with complexity similar to the examples on slides 26-28, 30-31, 34, or 38 would be entirely adequate.

If you're short on ideas for a problem, or if you want to be sure that your idea is suitable, ask the instructor.

Along the way to an imagined program you may find a buggy version that has interesting behavior. If the results are interesting don't hesitate to call a bug a feature and declare it done.

Be sure to include header comments that describe how to exercise the program.

Miscellaneous

Aside from code appearing in the class handouts, in the texts, or in messages from the instructor you may not seek, study, refer to, use, incorporate, etc., any existing solutions or portions thereof for any problem.

Reference Version

Both UNIX and Windows reference versions of `vals` are in `/home/cs451/a8`, along with some data files. Notify the instructor if the behavior of a reference version seems to contradict or extend a problem specification.

Deliverables

Use `turnin` with the tag `451_8` to submit your solutions for grading. The deliverables for this assignment are `vals.icn` and `amuse.icn`. If your `amuse.icn` needs data files, submit those as well.