21$^{\text{st}}$ Annual

Rowan University Programming Contest

hosted by the

Computer Science Department

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Typesetting and Typewriting

Johannes Gutenberg

When movable type was invented, the metal pieces could be varied as necessary; an 'i' was narrow, and an 'M' was wide.

Typewriters

Early typewriters required all characters to be the same width, because the mechanical linkages for letters of different widths were too complex.

`Here is a sample of a monospaced font.`

For this to work, narrow letters such as 'i' need large serifs, and wide letters such as 'm' have to be compressed.

Early Computers

Early computers also had fixed-width characters.

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The quick brown fox jumped over
the lazy dogs.
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Word-wrapping and editing features made these easier to use than typewriters, but the result doesn't actually look very different.
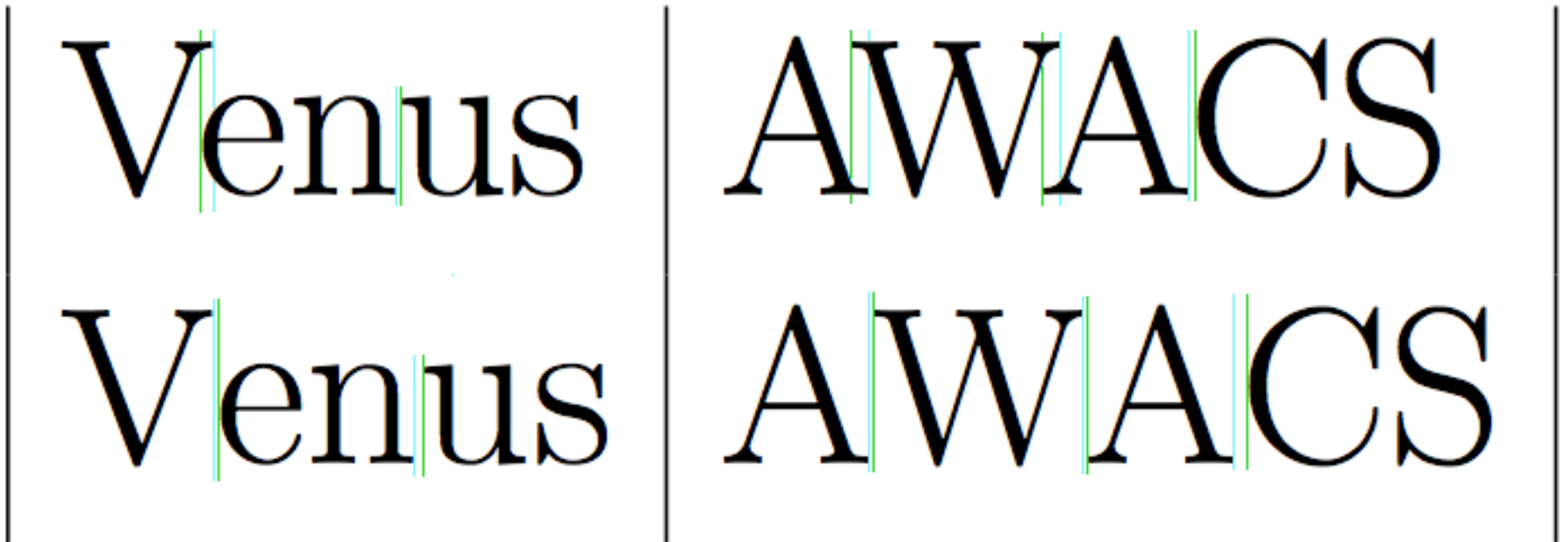
Better Computers

Variable-width letters make word-wrapping harder: you have to take into account the width of each letter.

This font has variable-width letters in it.

Work printed on a computer looked better this way, but it still hasn't caught up to typesetting.
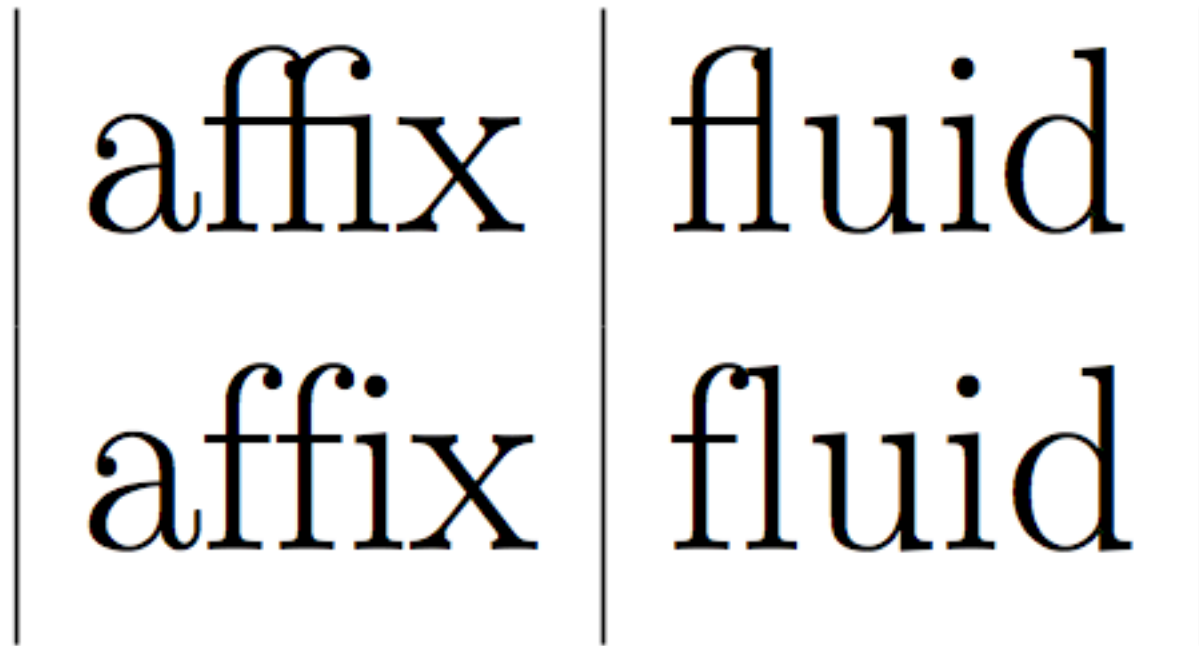
Kerning

Some letters look better when the spacing is carefully adjusted:

The letters on the top line have been moved closer so it's not too blank-looking. The 'W' is actually *over* the 'A's, and the 'e' has been moved under the 'V'.

Ligatures

In other situations, things look better if you join separate letters together:

affix fluid

affix fluid

Moving the letters apart would leave too much space, but left as they are in the bottom row they seem to run into each other. So they've been connected together into a single item.

Even Better Computers

Some fonts are very intricate, and have ligatures and kerning rules which produce amazing results.

The Wizard of Oz

Note how the 'Th' is one large ligature, how the 'z' extends completely under and past the 'a', and how the 'f' extends so far it actually overlaps both the previous and following word.

The Challenge

Using fonts like this goes beyond word-wrapping: if you want to center a title, you can't just use the width of each character. You have to consider kerning and ligature rules.

For this contest: write a program that scans a line of text and prints out how wide it is, taking into account not just the widths of the letters, but also the adjustments that result from kerning and ligature rules.