

Typography

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Introduction

- Looked at the beginning at representing text in a computer
- And then how to describe the appearance of a page
- Now going to start to looking at how to convert from text to into a PDL
- Formatting algorithms

Formatting

- At its most basic formatting text is breaking it into words and fitting them into a space forming lines
- But it turns out its a hard problem to solve
- Because the text has to look nice
- And computers don't do nice...

Formatting

- Lots of parameters that affect formatting
- All of which are interrelated, so changing one may require you to change another
- And the effects are psychological affecting the readability of a block of text

Formatting

- Goal is to be able to quantify good layout
- Computer can then select one layout over another
- To do that we're going to need to understand what makes good text layout
- And so understand the lingo of typography
- A lot of the terms are steeped in history...

Mainly from hot-metal typesetting...
Show face to face with progress ;)

Measurements

- Basic units of measurement in typography are the *point* and the *pica*
- Derived from the inch
- Point is $1/72$ inch
 - Traditionally, has been slightly less but now rounded to $1/72$
- Pica is a $1/12$ inch (or 6pts)

$\sim 1/72.27$

So 12 point text is 1pica high

Measurements

- These are absolute measurements
- It's also useful to have measurements that are relative to the current point size
- Particularly used for horizontal spacing to remain proportional as the font gets bigger

em and en

- One such relative measurement is the *em*
- Specified as being the same as the point size
- Also have the *en* which is half the point size
- Will also see references to M/3, M/4 and M/5

Character size

- The size of text is referred to the *point size* (and not font size)
- Describes the distance from baseline to baseline when text is *set solid*
- That is when the bits of metal type are abutted together

Letterforms have tone, timbre character,
just as words and sentences do. The moment a text
and a typeface are chosen, two streams of thought,
two rhythmical systems, two sets of habits, or if
you like, two personalities, intersect They need
not live together contentedly forever, but they
must not as a rule collide

Unfortunately, set solid text is hard to read. Much easier to read when the lines are broken
apart

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Leading

- To enable the text to breathe and make it more readable the lines were moved apart
- Traditionally done by inserting a small slug of lead between each line
- This was referred to as the *leading*

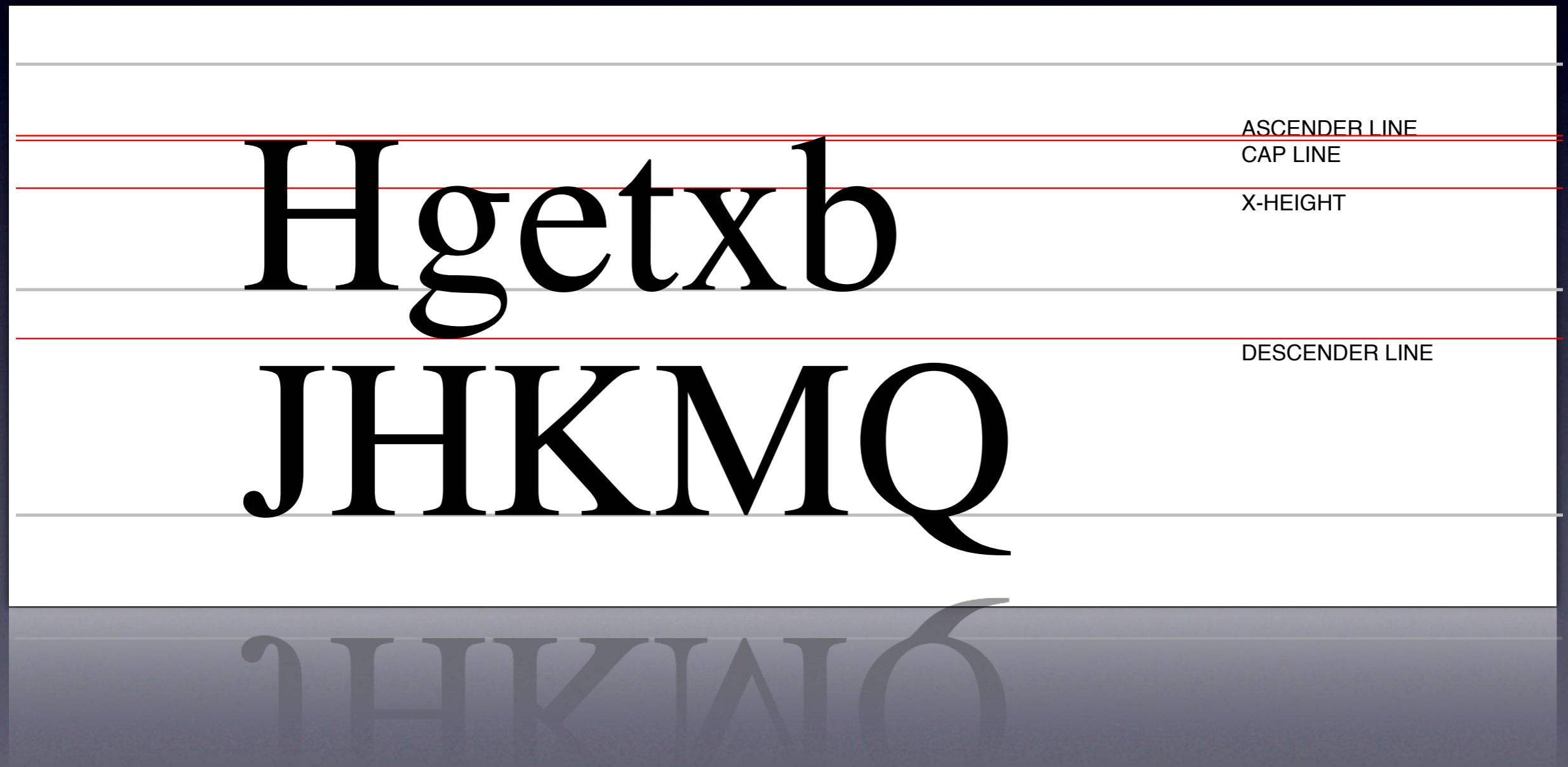
Leading

- Leading used to refer to the slugs' size
- So 2pt leading would mean put slugs 2pt high between each line of text
- These days it tends to be used to refer to the line height instead (distance between baseline to baseline)

Leading

- Has a big effect on the feel of the text
- 120% leading is a good rule of thumb (so 10 on 12)
- But as the text gets bigger you tend to need more
- Computers also allow for negative leading which can work for effect...

Text Measurements



Ascender line position where ascenders go to
Descender line position where descenders go to
Cap line Where capitals go to

x-height

- X-height is very important measurement
- Height of a lower case x (from the baseline)
- Sets how big a piece of text feels
- A font with a larger x-height at a smaller point size will appear bigger than a font with a smaller x-height at a larger font size

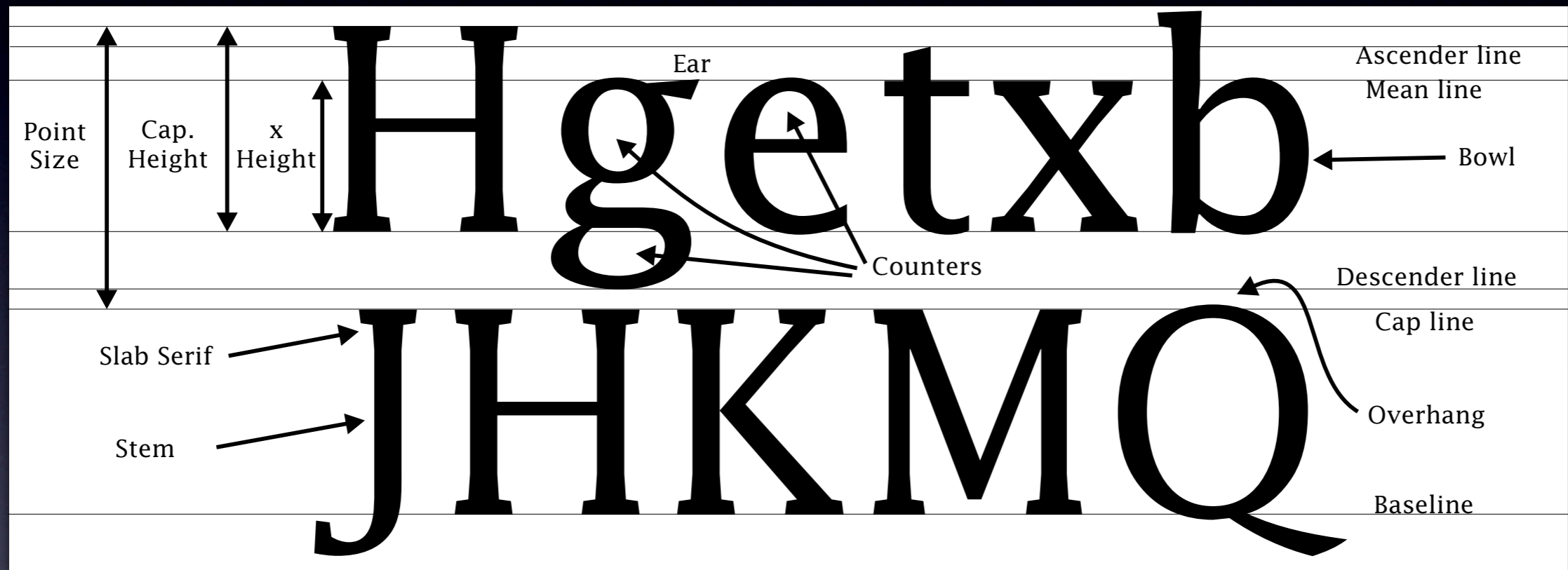
Which font is bigger? Which font is bigger?

Which font is bigger? Which font is bigger?

Times-Roman 42pt
x-height: 18.9pt

Lucida Sans 42pt
x-height: 22.26pt

Text measurements



Formatting

- Generally, we want to format text to fit some specific width
- In typography, referred to as the *measure*
- Again has an effect on readability
- Too long and its hard for the eye to follow
- Too short and it ends up being full of hyphens

Line length

Some readers might think that this line is too long to read all at once.

It would be twice as hard to read if there were more lines, and if those lines were set solid – with such tight linespacing that the words ended up right on top of each other.

As we increase the leading long lines become easier to read
34pt leading (set solid)

Line length

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As we increase the leading long lines become easier to read
36pt leading

Line length

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As we increase the leading long lines become easier to read
38pt leading

Line length

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As we increase the leading long lines become easier to read
40pt leading

Line length

Some readers might think that this line is too long to read all at once.

It would be twice as hard to read if there were more lines, and if those lines were set solid – with such tight linespacing that the words ended up right on top of each other.

As we increase the leading long lines become easier to read
42pt leading

Line length

Some readers might think that this line is too long to read all at once.

It would be twice as hard to read if there were more lines, and if those lines were set solid – with such tight linespacing that the words ended up right on top of each other.

As we increase the leading long lines become easier to read
44pt leading

Line length

Some readers might think that this line is too long to read all at once.

It would be twice as hard to read if there were more lines, and if those lines were set solid – with such tight linespacing that the words ended up right on top of each other.

As we increase the leading long lines become easier to read
46pt leading

Line length

- Eye has to track across long lines of text
- And the longer and denser the text is packed the harder it is
- Increasing the leading helps guide the eye along the text

Aiming to make the eye mainly be doing vertical scanning and not horizontal motion

Optimal Line Length

- Generally good if there's between 45–75 characters per line (including spaces)
- 66 characters per line is considered ideal
- Depends on the point size (and also the width of the font)

Formatting

- Once we have a measure, then formatting text is just a matter of fitting the words into the measure
- But there are many options for how this can be done

Left-justified

- One option is to leave the right-hand edge uneven
- This is known as left-justified, ranged left, or ragged right text
- When the next word will no longer fit on the line begin another line

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Right-justified

- Can also have the opposite where the right hand edge is fixed
- Right justified, ranged right, or ragged left
- Harder to read so generally only occasionally

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Rag

- Can have a hard rag, or a soft rag
- In a soft rag, the lines aim to be of a similar length
- While a hard rag allows greater variation and doesn't hyphenate...

Fully-justified text

- The other option is to fully justify the text
- So both the left and right edges are aligned
- But this poses a problem, we have indivisible units (words) to fit in the measure
- In most cases, the words won't fit the line length exactly...

Fully-justified text

- In this case, we need to do something to make the text fit
- Could hyphenate but that just gives us smaller indivisible units
- Alternatively distribute the space evenly throughout the whole line rather than leaving it at the end

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Note space at the end of the line

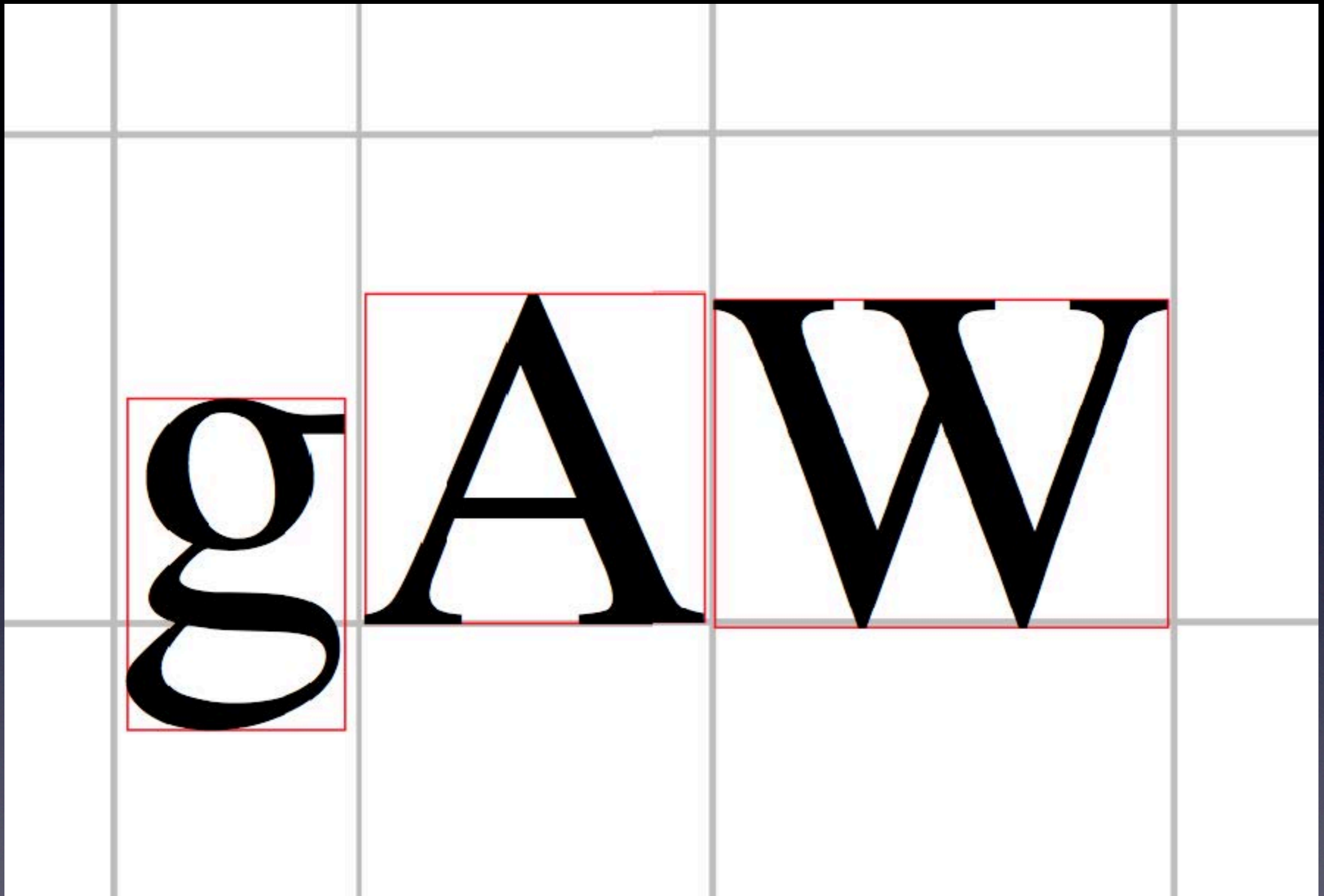
By distributing this evenly throughout the line we can make the words fit the line

Spaces

- Space in a line is available in several locations
- Word space — gap between words
 - Necessary to signify the separation between words
 - Usually a fixed size in the font
 - But could vary it

Character Space

- Also there's inherent space between each character (built into the font)
- Each character has a natural width as well as its bounding box
- This is used to advance the position for the next character
- Could adjust this...



Grey lines show the character widths
red boxes show the character bounding boxes
Note how there's a natural gap between the pairs of character bounding boxes

Kerning

- Often necessary to adjust the space between characters anyway to make it look nice
- For example, *AW* looks much nicer if the *W* is allowed to slide in next to the *A*



← - - - - - →
Glyph Width



Monospace

- Fonts come in two types
- Monospaced
 - All glyphs are the same size
- Proportionally spaced
 - Glyphs vary in width
- Can only really use character spacing with proportionally spaced fonts

Monospace fonts are great for displaying code...

ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ

Gill Sans (proportional)
Courier (monospace)
Futura (proportional)

Justifying text

- Can vary word spacing (generally between M/3 and M/5 acceptable)
- Can vary character spacing (less desirable)
- Hyphenate
- Alter where we break lines (can help)
- Adjust intracharacter spacing (distort font)

By using a mixture of these it is possible to get some nicely typeset effects

Rivers, Widows and Orphans

- To achieve nice looking text, it's also important to watch out for some issues that can occur
- Rivers are long stretches of white space flowing vertically down the page

Rivers, Widows and Orphans

- Widows — single lines of text left alone at the top of columns
- Orphans have two meanings
 - Words left alone on a single line at the end of the paragraph
 - Lines of text left over from paragraphs at the bottom of columns

takes stock of the situation:

Shanghai, 1645 hours, Friday, the 28th of November 1941. Bobby Shaftoe, and the other half-dozen Marines on his truck, are staring down the length of Kiukiang Road, onto which they've just made this careening high-speed turn. Cathedral's going by to the right, so that means they are, what? two blocks away from the Bund. A Yangtze River Patrol gunboat is tied up there, waiting for the stuff they've got in the back of this truck. The only real problem is that those particular two blocks are inhabited by about five million Chinese people.

Now these Chinese are sophisticated urbanites, not suntanned yokels who've never seen cars before—they'll get out of your way if you drive fast and honk your horn. And indeed many of them flee to one side of the street or the other, producing the illusion that the truck is moving faster than the forty-three miles an hour on its speedometer.

But the bamboo grove in Bobby Shaftoe's haiku has not been added just to put a little Oriental flavor into the poem and wow the folks back home in Oconomowoc. There is a *lot* of heavy bamboo in front of this truck, dozens of makeshift turnpikes blocking their path to the river, for the officers of the U.S. Navy's Asiatic Fleet, and of the Fourth Marines, who dreamed up this little operation forgot to take the Friday Afternoon factor into account. As Bobby Shaftoe could've explained to them, if only they'd bothered to ask a poor dumb jarhead, their route took them through the heart of the banking district. Here you've got the Hong Kong and Shanghai Bank of course, City Bank, Chase Manhattan, the Bank of America, the BBME and the Agricultural Bank of China and any number of crappy little provincial banks, and several of those banks have contracts with what's left of the Chinese Government to print currency. It must

widow

orphan

Glyphs

- You'll notice that I've been talking about glyphs rather than characters
- That's because to achieve nice typographical effect characters don't always get typeset as is
- Sometimes its nicer to replace characters with other variants

Ligatures

- The classic example of this are ligatures
- Some characters look ugly when placed next to each other (e.g. fi and fl)
- So they are replaced by special glyphs called ligatures that are designed to look nice (e.g. fi)