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Font / قلم



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سه گانه زبان و ادب پارسی بر پهنه سپهر مجازی

- دفتر اول: قلم

- دفتر دوم: قلم پارسی، زبان پارسی، نشر رومیزی

- دفتر سوم: سامانه یونیکد، زبان پارسی و سپهر مجازی



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Line Spacing

Typography

Line Length

Face of Type

Point Size



به هنر و تکنیک چیدمان نشانه‌ها  
تایپوگرافی گفته می‌شود

"Typography is now something everybody does."



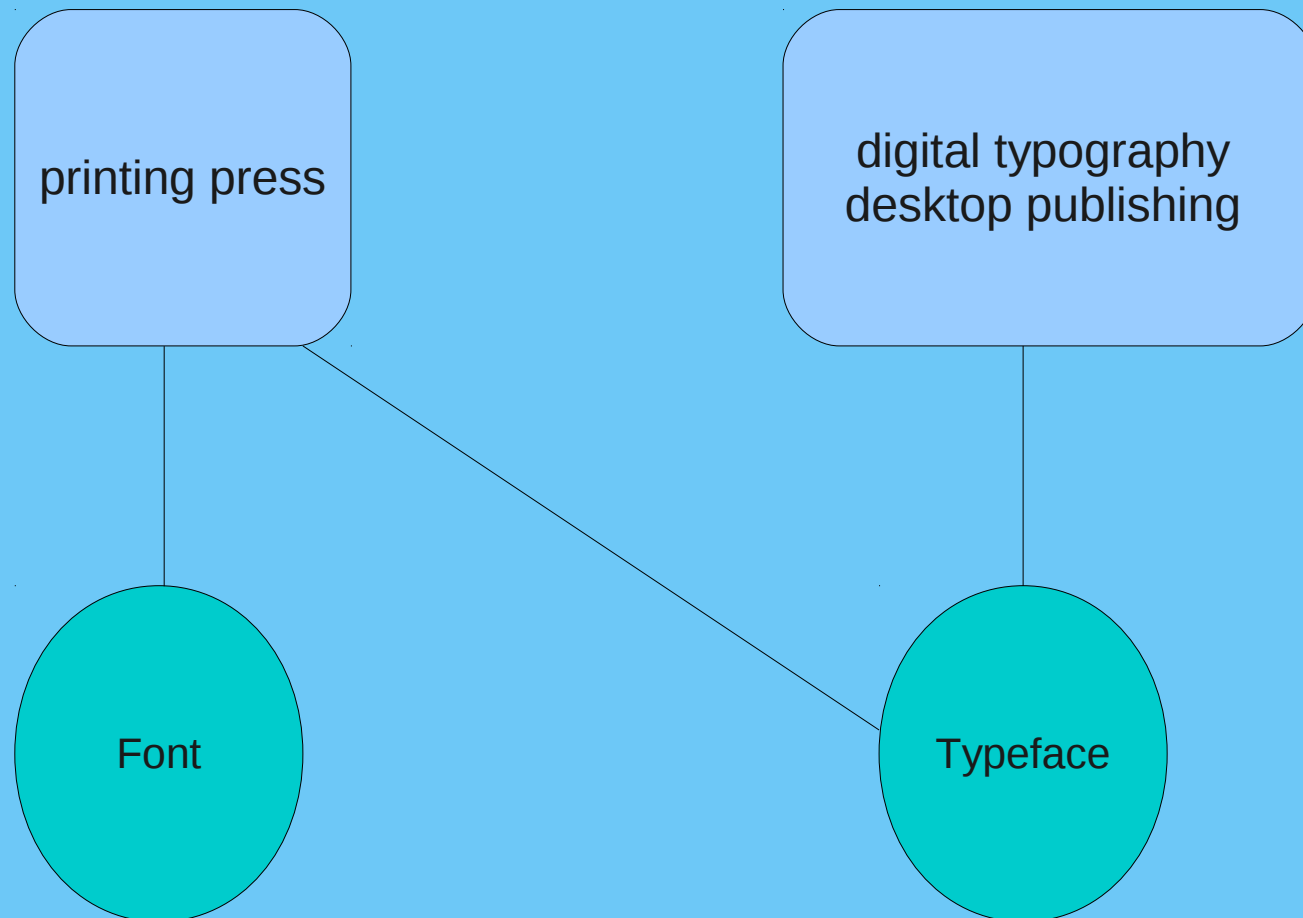
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## What is font:

Wikipedia: In typography, a font is traditionally defined as a quantity of sorts composing a complete character set of a single size and style of a particular typeface.

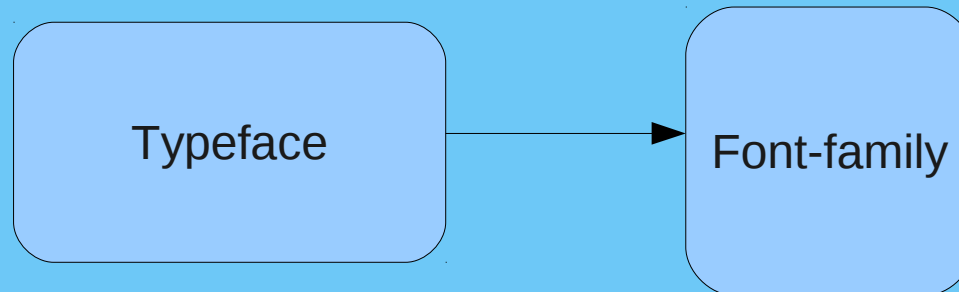
“9-point Bulmer” is called a font, and the “10-point Bulmer”

قلم چیست؟

بطور سنتی، مجموعه ای از نشانه ها با شکل، سبک و اندازه یکسان قلم گفته می شود

## What is Typeface?

In typography, a typeface is the artistic representation or interpretation of characters



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## Typeface anatomy

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**serif** :: Times new roman  
Microsoft's version of Times New Roman  
licensed from Monotype  
Free alternatives:  
FreeSerif  
Liberation Serif

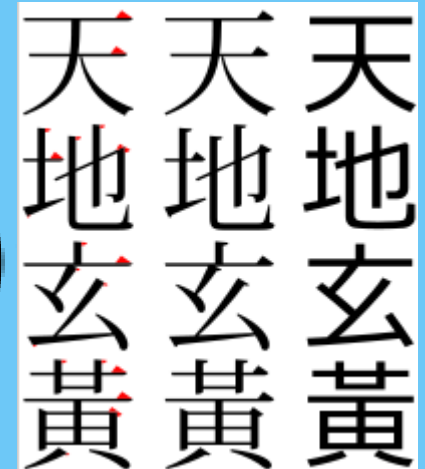
---

**Sans-serif** :: Arial :: Microsoft  
Free alternatives: Liberation Sans is a  
metrically equivalent font to Arial  
developed by Ascender Corp. and  
published by Red Hat in 2007 under the  
GPL license with some exceptions

---

**Monospace** :: FreeMono

AaBb



AaBbCc

Proportional  
Monospace



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## **Computer Font:**

A computer font (or font) is an electronic data file containing a set of glyphs, characters, or symbols such as dingbats.

به داده های الکترونیکی شامل مجموعه ای از گلیف ها، نشانه ها یا علائم، فونت (قلم) کامپیوتری گفته می شود.

قلم کامپیوتری حاصل تحقیقات بسیار یشرفته آزمایشگاه های شرکت های عظیم است.

**Apple : AAT or Apple Advanced Typography**

**Microsoft: Microsoft Typography**

**Adobe: Adobe Type**



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گلیف (Glyph): به حالات نمایشی یک نشانه گلیف گفته می شود.

ب ، ب ، ب ، ب

گلیف های ترکیبی (Glyph): به گلیفی که ترکیبی از چند گلیف باشد.

آ، ا، ئ، ...







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## Computer Font Types:

### - Raster Fonts (Fast Render, Low Quality)

8, 9, 10, 12, 14, 18, 24, 36, 48, 72, and 96 points

\* Portable Compiled Format (PCF)

Use in Console

```
XVP Viewer - XenServer Console - keen
Disconnect Options Clipboard Ctrl-Alt-Del Refresh Shutdown Reboot Reset
Fedora Core release 6 (Zod)
Kernel 2.6.20-2.durxen on an x86_64

keen login: root
Password:
Last login: Mon Apr 27 14:39:02 on xuc0
[root@keen ~]# ls -l /usr
total 192
drwxr-xr-x  3 root root  4096 Feb 10 16:30 X11R6
drwxr-xr-x  2 root root 36864 Apr 10 04:51 bin
drwxr-xr-x  2 root root  4096 Oct 10 2006 etc
drwxr-xr-x  2 root root  4096 Oct 10 2006 games
drwxr-xr-x 53 root root  4096 Apr 21 20:42 include
drwxr-xr-x  6 root root  4096 Sep  6 2007 kerberos
drwxr-xr-x 49 root root 24576 Feb 10 18:50 lib
drwxr-xr-x 83 root root 36864 Apr 22 04:52 lib64
drwxr-xr-x 13 root root  4096 Feb 10 18:51 libexec
drwxr-xr-x  5 root root    0 Apr 27 14:17 local
drwxr-xr-x  2 root root 12288 Apr 27 12:31 sbin
drwxr-xr-x 171 root root  4096 Apr  8 16:16 share
drwxr-xr-x  3 root root  4096 Feb 10 16:32 src
lrwxrwxrwx  1 root root   10 Feb 10 16:29 tmp -> ../var/tmp
[root@keen ~]#
```



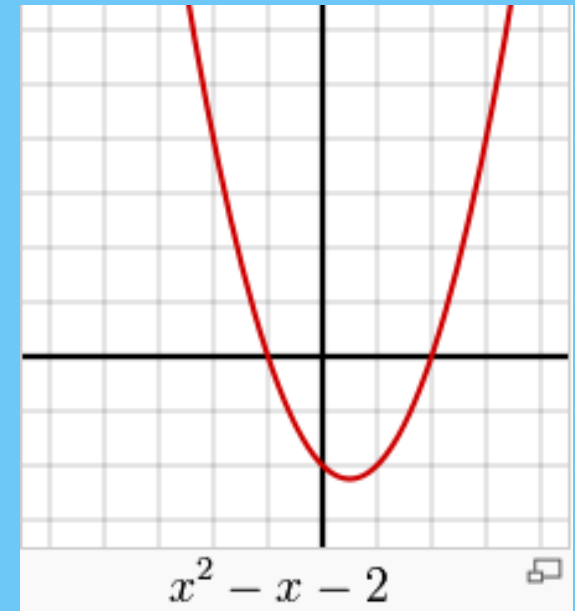
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## Computer Font Types: - Outline Fonts (Complicated Render, Very High Quality)

\*\* Glyph based on Bézier curve

$$p(t) = (1-t)^2p_0 + 2t(1-t)p_1 + t^2p_2$$

$$(a)X^2 + (b)X + C = 0$$





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## **Format of outline fonts:**

Type 1 and Type 3 : [.pfb](#), [.pfa](#) : Adobe

TrueType : [.TTF](#) : Apple

OpenType: [.OTF](#) : Microsoft & Adobe



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## **TrueType :: .TTF**

Developed by Apple Computer, Apple licensed TrueType to Microsoft

FreeType project of David Turner attempts to create an independent implementation of the TrueType standard

- FreeType FreeType is included in many Linux distributions



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# OpenType: .OTF

Created by Microsoft and Adobe, built on its predecessor TrueType

1. Accommodates the Unicode character encoding (as well as others), so that it can support any writing script (or multiple scripts at once).
2. Accommodates up to 65,536 ( $2^{16}$ ) glyphs.
3. Advanced typographic "layout" : **kerning**, **Baseline**, **ligatures**
4. Cross-platform font files, which can be used without modification on Mac OS, Windows and Unix systems.



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## **kerning :**

process of adjusting the spacing between characters in a proportional font



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## Baseline

بالاترين ارتفاع

اديب بهروز

خط اصلي Baseline

پايين ترين ارتفاع



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## Typographic ligature:

ترکیب اجزاء زبان نوشتاری که منجر به ایجاد یک گلیف جدید می شود

لا = ا+ل

ا ≠ ا+ل

<i>AE</i> → <i>Æ</i>	<i>ij</i> → <i>ij</i>
<i>ae</i> → <i>æ</i>	<i>st</i> → <i>st</i>
<i>OE</i> → <i>Œ</i>	<i>ft</i> → <i>ft</i>
<i>oe</i> → <i>œ</i>	<i>et</i> → <i>&amp;</i>
<i>ff</i> → <i>ff</i>	<i>fs</i> → <i>β</i>
<i>fi</i> → <i>fi</i>	<i>ffi</i> → <i>ffi</i>





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## 1) Subpixel:

Sample Length:	9									7							8							
Channel Membership:	Red									Green							Blue							
Bit Number:	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

## 2) Font rasterization:: (Font Render Engine)

Microsoft :: ClearType : subpixel rendering technology

Mac OS X's :: Quartz

PDF documents are usually rendered with Adobe CoolType.

Most other systems use the FreeType library

2-1) anti-aliasing :: 50% gray

2-2) Font hinting :: remove extra Shadow





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## Point . Pixel . Em . % ::

1 point = 1/72 inches = 25.4/72 mm = 0.3527777777777778 mm  
pixel\_size = point\_size \* resolution(dpi) / 72

Pixels	EMs	Percent	Points
6px	0.375em	37.5%	5pt
7px	0.438em	43.8%	5pt
8px	0.5em	50%	6pt
9px	0.563em	56.3%	7pt
10px	0.625em	62.5%	8pt
11px	0.688em	68.8%	8pt
12px	0.75em	75%	9pt
13px	0.813em	81.3%	10pt
14px	0.875em	87.5%	11pt
15px	0.938em	93.8%	11pt
<b>16px</b>	<b>1em</b>	<b>100%</b>	<b>12pt</b>
17px	1.063em	106.3%	13pt
18px	1.125em	112.5%	14pt
19px	1.188em	118.8%	14pt
20px	1.25em	125%	15pt
21px	1.313em	131.3%	16pt
22px	1.375em	137.5%	17pt
23px	1.438em	143.8%	17pt
24px	1.5em	150%	18pt

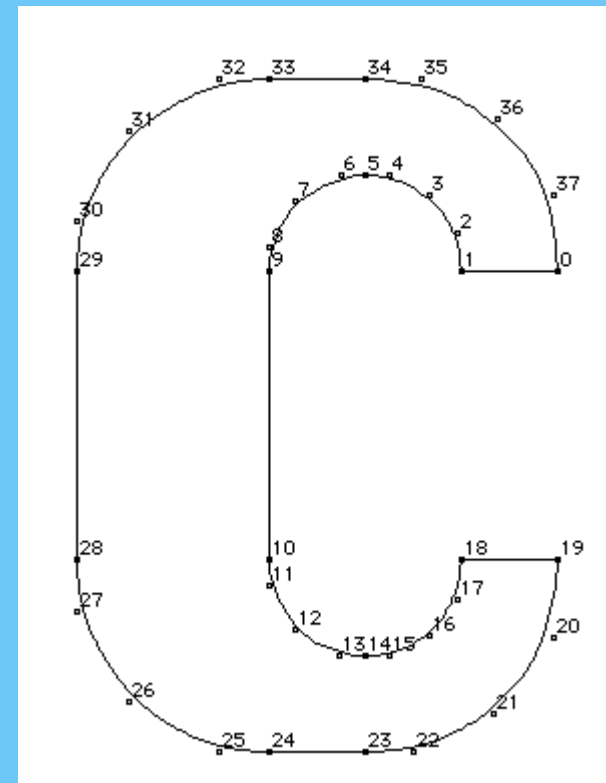
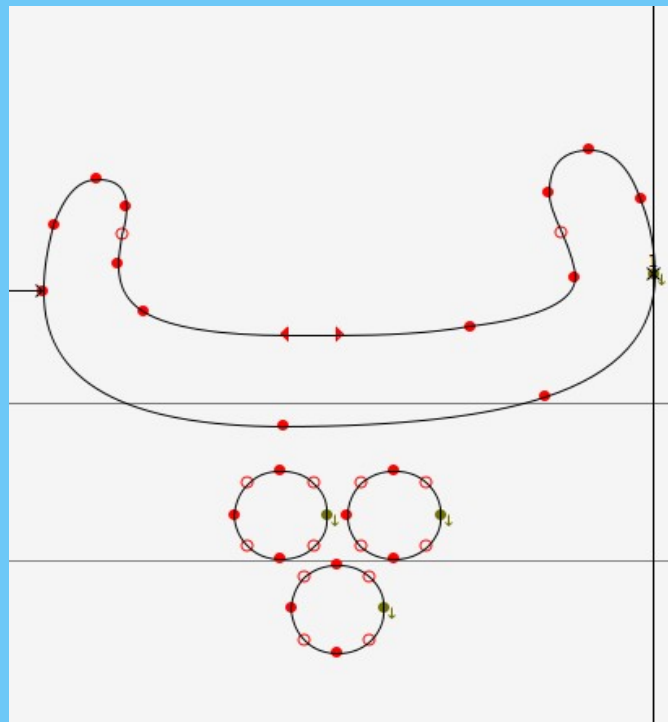
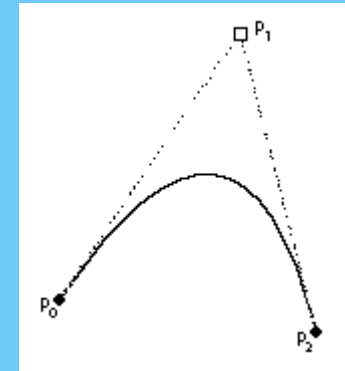


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## Glyph Structure:

\*\* Glyph based on Bézier curve

$$p(t) = (1-t)^2p_0 + 2t(1-t)p_1 + t^2p_2$$

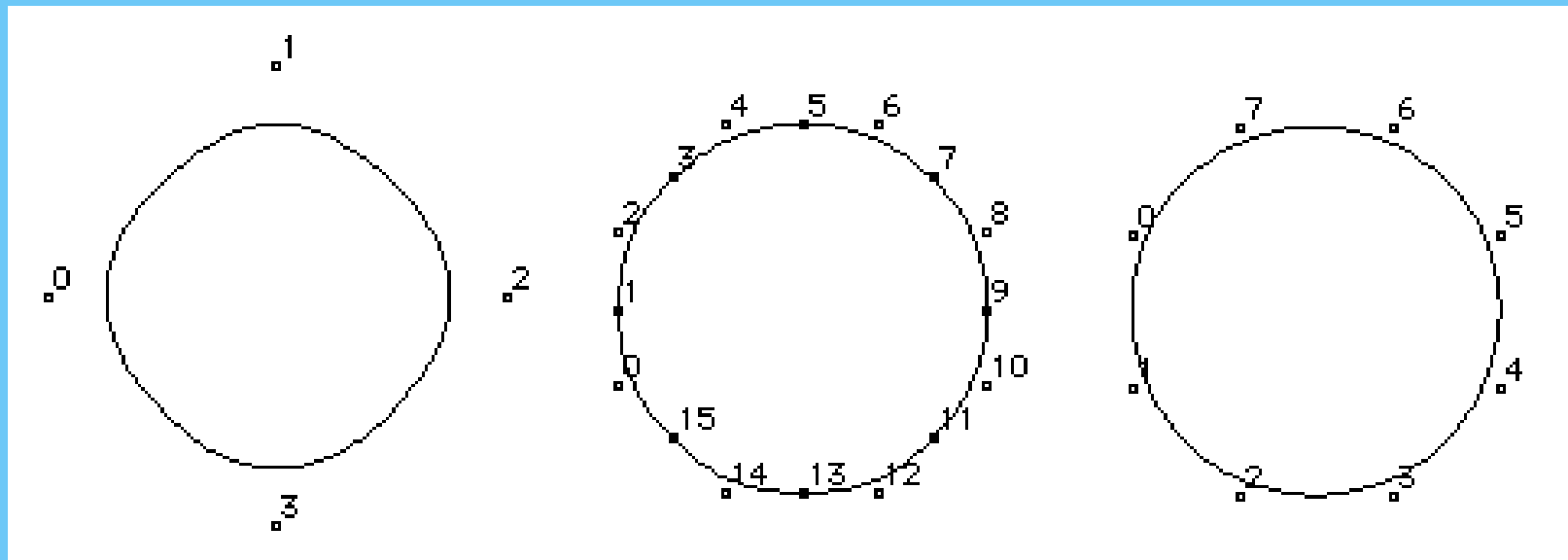




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# How many points are necessary?

Base on True Type



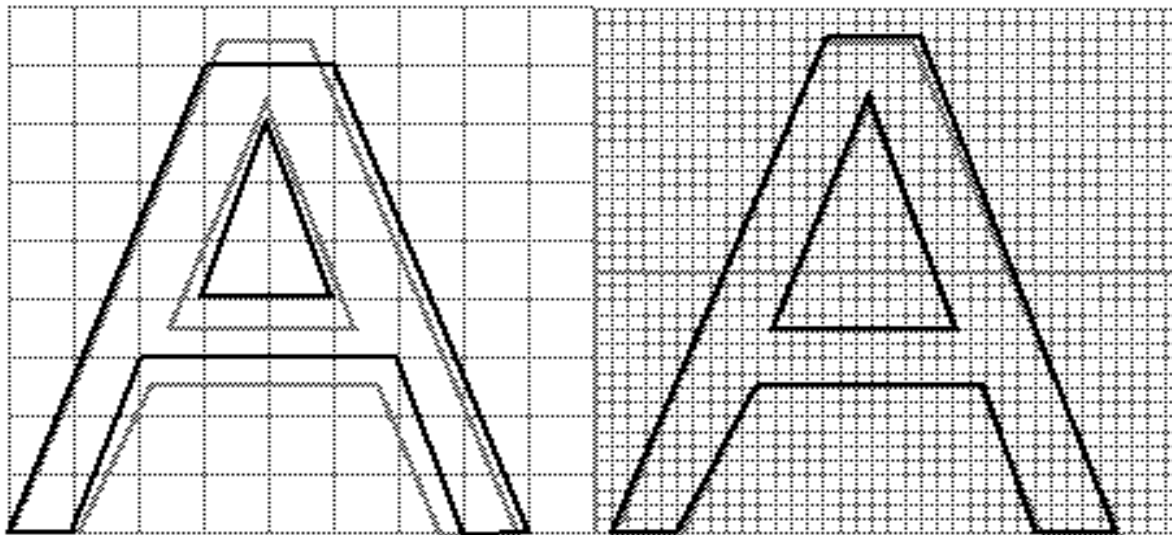


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# The Master grid, Master Outline (EM square):

$\text{pixel\_size} = \text{point\_size} * \text{resolution} / 72$  Sample:  $12 * 300 / 72 = 50\text{px}$  (Size of EM Square)

TrueType fonts use an EM size of 2048 units; Type 1 PostScript fonts have a fixed EM size of 1000 grid units but point coordinates can be expressed as floating values. Grid units are very often called font units or EM units.





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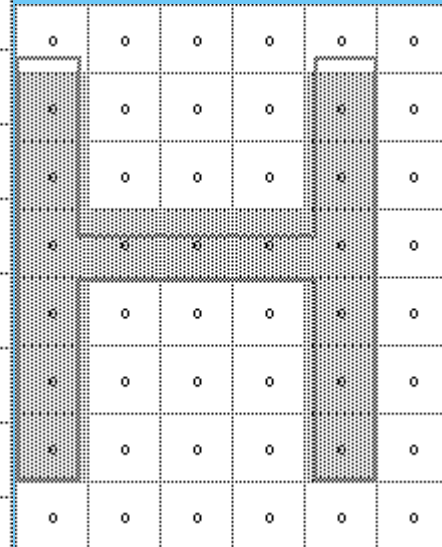
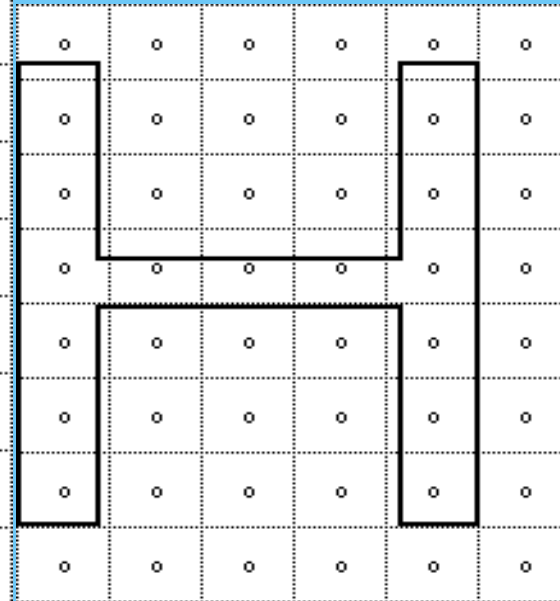
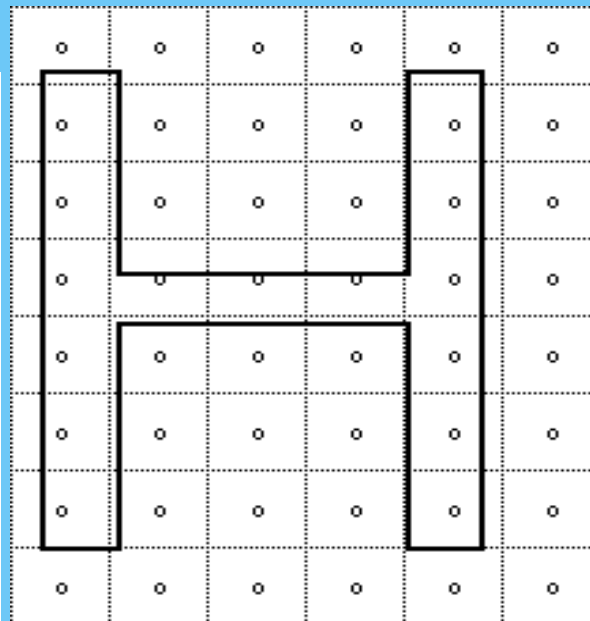
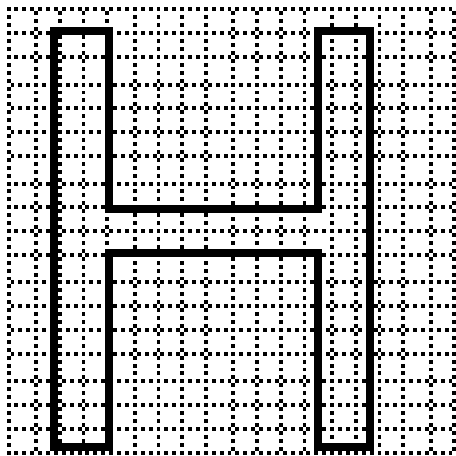
# Font Engine

Base on TrueType

## How the font engine works

- The master outline description of the glyph is scaled to the appropriate size.
- The scaled outline is grid-fitted according to its associated instructions.
- The grid-fitted outline is scan converted to produce a bitmap image suitable for raster display.

1. Master Outline -> 2. Scaled Outline -> 3. Grid-fitted Outline -> 4. Raster image



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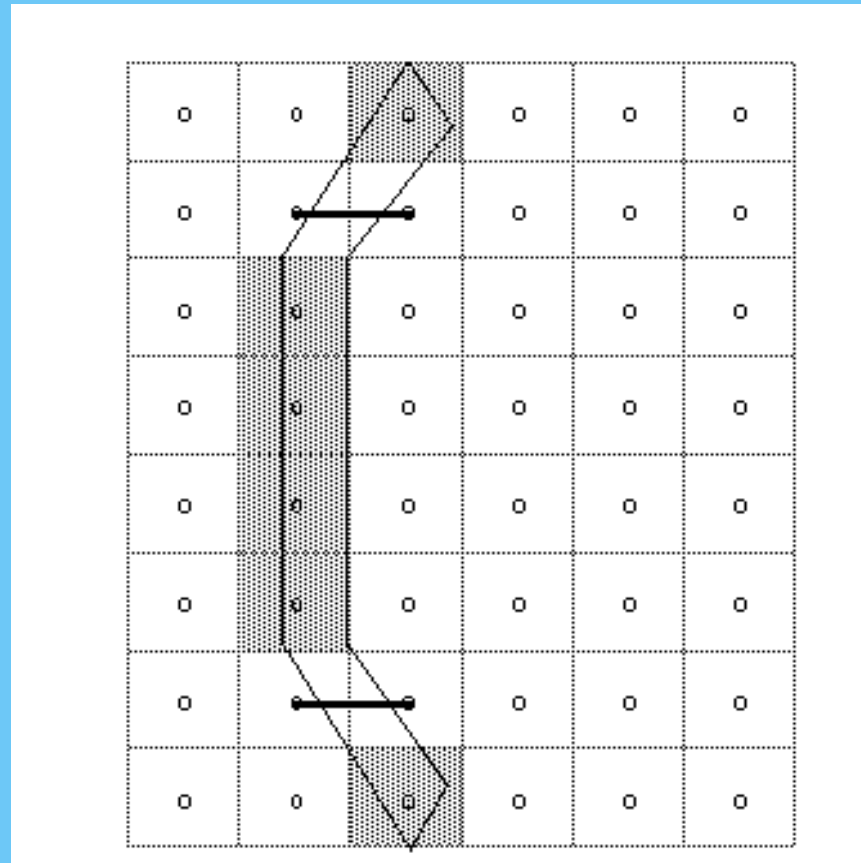
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# Dropout

A dropout is filled in using a DELTAP instruction





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## The TrueType Font File:

1. Glyphs ('glyf') :: glyph id
2. Character to Glyph Mapping ('cmap')  
subtables  
platform id ,...
- 3 . Glyph Names ('post'):
- 4 . Metrics, Style, Weight, etc. ('hmtx', 'hdmx', 'OS/2', etc.)  
hmtx: advance width, left side :: h. In right to left scripts,  
glyphs still are described using a left to right coordinate  
system.
- 5 . Kerning ('kern')

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## Font management software:

Linux desktop environments (such as KDE and Gnome) manage fonts for applications using their internal framework

Font-Manager  
Fontmatrix.org



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