Industrial Automation
(Automação de Processos Industriais)

CAD/CAM and CNC
Machines with Numeric Control

http://www.isr.tecnico.ulisboa.pt/~jag/courses/api20b/api2021.html

Prof. José Gaspar, rev. 2020/2021

"Jobs vs Gates", documentary National Geographic 2015
https://www.youtube.com/watch?v=5f6z96HWerE

Examples of CNC machines
(see main collection of slides)

Discuss:
Postscript (PDF) printers,
Graphic cards

And discuss:
Influence on GUI for OS

PostScript

Paradigm	Multi-paradigm: stack-based, procedural
Designed by	John Warnock, Chuck Geschke, Doug Brotz, Ed Taft, Bill Paxton
Developer	Adobe Systems
First appeared	1982; 39 years ago
Stable release	PostScript 3 / 1997; 24 years ago
Typing discipline	Dynamic, weak
Major implementations	
Adobe PostScript, TrueImage, Ghostscript	
Influenced by	
Mesa,[1] Interpress, Lisp	
Influenced	
PDF	

PostScript (file format)

Filename extension	.ps
Internet media type	application/postscript
Uniform Type Identifier (UTI)	com.adobe.postscript
Magic number	%!
Developed by	Adobe Systems
Type of format	printing file format
Extended to	Encapsulated PostScript

Examples of Postscript

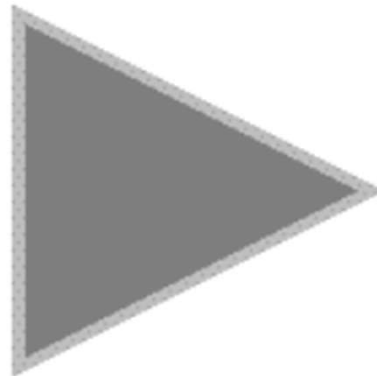http://paulbourke.net/dataformats/postscript/

```
newpath
100 200 moveto
200 250 lineto
100 300 lineto
2 setlinewidth
stroke
```
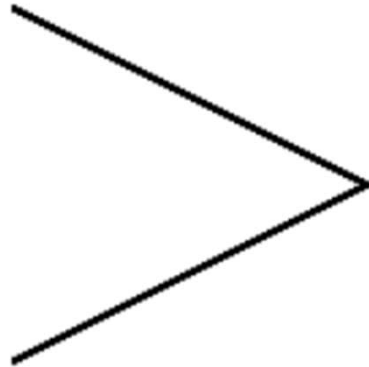
```
/Times-Roman findfont
12 scalefont
setfont
newpath
100 200 moveto
(Example 3) show
```

Example 3

```
newpath
100 200 moveto
200 250 lineto
100 300 lineto
closepath
gsave
0.5 setgray
fill
grestore
4 setlinewidth
0.75 setgray
stroke
```

```
/Times-Roman findfont
32 scalefont
setfont
100 200 translate
45 rotate
2 1 scale
newpath
0 0 moveto
(Example 4) true charpath
0.5 setlinewidth
0.4 setgray
stroke
```

Example 4

Brief history on Numerical Control

1947 – US Air Force needs lead John *Parsons* to develop a machine able to produce parts described in 3D.

…

1957 - NC starts to be accepted as a solution in industrial applications , with first machines starting to produce.

197x – Profiting from the microprocessor invention appears the CNC.

Postscript [April 2021, https://en.wikipedia.org/wiki/PostScript#History] :

1976 - Concepts of the PostScript language were seeded by John Gaffney at Evans & Sutherland, a computer graphics company. Researchers at Xerox PARC had developed the first laser printer and had recognized the need for a standard means of defining page images.

…

PostScript, history [April 2021, https://en.wikipedia.org/wiki/PostScript#History]

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1978 - John Gaffney and Martin Newell then at Xerox PARC wrote J & M for VLSI design and the investigation of type and graphics printing. This work later evolved and expanded into the Interpress language.

1982 - Warnock left with Chuck Geschke and founded Adobe Systems. They, together with Doug Brotz, Ed Taft and Bill Paxton created a simpler language, similar to Interpress, called PostScript, which went on the market in 1984. At about this time they were visited by Steve Jobs, who urged them to adapt PostScript to be used as the language for driving laser printers.

1985 - Apple LaserWriter was the first printer to ship with PostScript, sparking the desktop publishing (DTP) revolution in the mid-1980s. The combination of technical merits and widespread availability made PostScript a language of choice for graphical output for printing applications. For a time an interpreter (sometimes referred to as a RIP for Raster Image Processor) for the PostScript language was a common component of laser printers, into the 1990s.

PDF, a descendant of PostScript, has largely replaced PostScript as *de facto* standard for electronic document distribution.