

Lecture 25 - System Software

Videos

https://youtu.be/e8-vSbrHd_8 - Lect-26-2150-pt1.mp4
<https://youtu.be/PSlrGiWvWHg> - Lect-26-2150-pt2.mp4
<https://youtu.be/Gvo0-6umdKY> - Lect-26-2150-pt3.mp4
https://youtu.be/Qp_DgH6Py_4 - Lect-26-2150-pt4.mp4
https://youtu.be/_l3zcSE4P_c - Lect-26-2150-pt5.mp4
<https://youtu.be/vSMKOvXOlyc> - Lect-26-2150-pt6-Microcode-Notes1.mp4

From Amazon S3 - for download (same as youtube videos)

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relative and absolute paths

So what is a "relative" path and an "absolute" path?

You are at a location in the file system. You can find this out with the "pwd" command. This "prints the working directory".

```
$ pwd
/Users/pschlump/go/src/github.com/Univ-Wyo-Education/S20-2150/Lectures/Lect-25
```

Paths that are "absolute" start with "/". The "/" is the file separator. On windows it is a "back-slash". That is the "\" character. Backslashes have the top leaning to the left. Slash is the same as the "division" operator.

So my path starts out at the "top" with "/Users". On most Linux systems it will start out with "/home". On Windows it usually starts with "C:\". If you use the MinGW bash shell on windows you get "/c/" as the top of the system. One of the innovations of Unix in the late 1960s and early 1970s was to replace "special device" names with just paths in the file system. This made it much easier for all commands to deal with these devices in a uniform way. Another file that you can create on a

Unix/Linux system that will annoy Windows users is the file "nul". There is a Unix/Linux tool "cp" to copy a file. It is "cp from to" so...

```
cp abc.exe nul
```

That won't work on Windows. It is also very interesting to send file attachments to windows users with a file called "nul". This usually involves some very frustrated laughs.

File Extensions

Just using the "extension" on a file to determine the file type falls down a lot. For example. Let's say that I have a Structured Vector Graphics file - an image specified in a text format. I would like to edit it with my text editor to change it.

For example the 7 segment display with file. 7-seg-1.svg. Let's cat it.

```
$ cat 7-seg-1.svg
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN" "http://www.w3.org/Graphics/SVG/1.1/DTD/
<svg xmlns="http://www.w3.org/2000/svg" width="192px" height="320px" viewBox="-1 -1 12
<g id="abcdefg" style="fill-rule:evenodd; stroke:#FFFFFF; stroke-width:0.25; stroke-opa
  <polygon id="a" points=" 1, 1 2, 0 8, 0 9, 1 8, 2 2, 2" fill="#bbbbbb"/>
  <polygon id="b" points=" 9, 1 10, 2 10, 8 9, 9 8, 8 8, 2" fill="#ff0000"/>
  <polygon id="c" points=" 9, 9 10,10 10,16 9,17 8,16 8,10" fill="#ff0000"/>
  <polygon id="d" points=" 9,17 8,18 2,18 1,17 2,16 8,16" fill="#bbbbbb"/>
  <polygon id="e" points=" 1,17 0,16 0,10 1, 9 2,10 2,16" fill="#bbbbbb"/>
  <polygon id="f" points=" 1, 9 0, 8 0, 2 1, 1 2, 2 2, 8" fill="#bbbbbb"/>
  <polygon id="g" points=" 1, 9 2, 8 8, 8 9, 9 8,10 2,10" fill="#bbbbbb"/>
</g>
</svg>
```

So SVG is a text format. We can edit it with a text editor. In fact the 1st line in it indicates that it is an XML file. XML is a text format!

But it is also an "image" We can convert it to a .png - a binary image format. You probably don't have it installed on your system but there is a command that reads SVG and outputs .png.

```
/usr/local/bin/rsvg-convert 7-seg-1.svg > 7-seg-1.png
```

Then you can look at it as an image.



Your browser can also display it as an image. The Graphics for "<http://www.2c-why.com/>" are all done in SVG.

What happens when you "double" click on it? On a default mac it comes up in the browser. On my system it shows up in Visual Studio Code as an image. What fails to happen is it showing up in an editor for text to edit it.

This is an incomplete list of programs that could be associated with ".svg" on my system - I use all of them!

Program	Description
Google Chrome	browser
Firefox	browser
InkScape	image editor
Adobe Illustrator	image editor
gimp	image editor
opera	browser
MacVim	editor
Vim	editor
Atom	editor
Microsoft Visual Studio	editor / IDE
AutoDesk sketchbook	image editor
hugin	image processing tool

Program	Description
Preview	image display tool
Safari	browser
screenflow	screen capture tool
textedit	text editor
XCode	Apple development IDE
PyCharm	Python IDE
xml-explore	XML data editor

These are just the programs that are GUI based - not all the command line tools that I use to process images!

So which one should be "associated" with .svg? On any given day I might use 5 to 10 of these!

ls - directory listing

`ls` lists the contents of a directory.

`ls -l` long list.

File permissions.

`ls -ltr` list in reverse order based on time.

`ls -al` list all the files.

`ls -1` list in 1 column.

mkdir and rmdir.

Create and remove directories.

```
$ mkdir t1
$ ls >t1/ls-out
$ rmdir t1
$ rm t1/ls-out
$ rmdir t1
```

Pipes

`cat a.txt b.txt > all.txt` - why is "cat" a for concatenate.

`cat -n a.txt b.txt > nnn.txt`

`cat a.txt a.txt a.txt > 3.txt` - make 3 copies.

`cat -n a.txt | grep 3`

Wild Cards

`ls *.txt`

`echo *.txt`

`ls 7*`

So Far..

Command	Description
cat	concatenate files or list to screen.
mv	rename, "mv from to" or change path, "mv old/path new/path".
ls	list a directory.
rm	remove a file, or list of files.
mkdir	create a directory.
rmdir	remove an empty directory.
pwd	current working directory.
cd	change current working directory.
man	get manual pages.
grep	(g)lobal (e)xpression (p)rint.
ps	list processes.
kill	kill a process by process id.
awk	a programming language
cut	pick a column.
chmod	change permissions on a file.
#!	Scripts running a tool.

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