ES103 – Programming II

Term I, 2015-16

Assignment 5: Printers and Files

One of the facilities supported by a typical operating system is that of printing files. There are many kinds of files – text, images, object, audio, etc. – and many kinds of printers – laser, inkjet, dot-matrix, etc., and each can be black-and-white (bw), grayscale or colour. Further, the set of file types and printers can keep expanding as new formats and new printers are developed.

Our system supports the following entities:

Files: each file has a name (string) and size in bytes (int). An actual file in the system would be an instance of a sub-type of File. A File can also create a printable representation (as a string) of its contents. More on this later.

Folder: contains a list of zero or more Files. Folders do not know the specific subtype of a File, but just act as a container of Files

Printer: each printer has a name (string). A printer can be checked to see if it is available or not. A printer supports a request to print a file in a certain mode (Colour or BW)

Server: manages a set of Printers. All requests to printers are routed through the Server. It also maintains one of the printers as the "Defualt" printer. The Server also provides the notion of time to the rest of the network. A call to getTime() of the printer returns the time in secs since the program was started. There is only one Server in the system. The Server does not know the subtype of a printer nor can it query it to check its subtype.

A user can perform one of the following tasks:

1. Create folders. Folders are created with a name
2. Create a file – of subtype Text, Image, or Audio. The name of the file is mandatory. You can choose to structure the data within the sub-type any way you want. Also, the actual contents of the file can be arbitrary.
3. Add a file to a Folder.
4. Request printing of a file on a specific printer. This is an operation on the Server. User can skip specifying the printer name if the Default printer to be used. The user also specifies if the file should be printed in colour or bw. Defaults to "colour"

When a user requests a print action, the following sequence of events occurs:

1. The server checks with the specified printer (Default if none is specified) if it can handle the given File and the print type (bw or colour). The printer responds if it can handle this.
2. If it can be supported, the Server checks if the printer is available. If so, it sends the print request to that printer. Else, it adds that job to the list of print requests for that printer.
3. When a printer processes a print job, it asks the File to return a printable representation of its contents. For now, we will assume this is a string. The printer knows how to convert this string to lower level print commands.

a. The File creates a string that represents its contents. The exact content of this string is not important. You can implement the body of this method to return any string. Text and Image files know how to convert themselves to strings, audio and object files do not.

The printer also estimates the amount of time it will take to print the file, and marks itself unavailable for that amount of time (say, in secs). For this exercise, assume each print request is estimated to require a random time between 3 and 10.

4. When the Server is free, it continuously scans the list of pending tasks, and if the corresponding printer is available, it sends that print job to that printer. It terminates when there are no more pending jobs. A pending file should be printed only on the printer mentioned in the original request. If the request did not specify a printer, then the printer which was default at the time of processing the request should be used.

The program should **output** the following:

When the server receives a request, it should print one of the following:

Setting Default Printer to <printername>

Spooling file <filename> for <printer> // if it needs to add a file to the pending tasks

Sending file <filename> to <printer> // when it actually sends the file to the printer.

The printer prints:

<Printer name>: printing file <file name> in <BW or Colour> mode

There should be no other output. Any debug prints should be appropriately suppressed in the submitted assignment.

The **input** to the program is a file containing the following:

The first line specifies n, the number of printers.

The next n lines define printers. The data consists of a name, the type (INKJET, DOTMATRIX, LASER) and whether is it COLOR or BW. Each of these are created and added to the Server

The next line starts with FOLDER and has the name of the folder to be created.

The next line specifies m, the number of files

The next m lines are file descriptions: Name, type (TEXT, AUDIO, IMAGE)

Each of these is created (with the appropriate subtype) and added to the Folder created earlier

The remaining lines are requests to the print server. There are two kinds of requests:

SETDEFAULT <name of printer>

PRINT filename <bw or colour – optional, defaults to colour> <printer name – optional>

The file contains an arbitrary sequence of SETDEFAULT and PRINT requests

When end of file is seen, the server processes the tasks still pending for one or more printers.

Input data. (This can be read in from an input file or from standard input – cin)

4

PRA LASER COLOUR

PRB LASER BW

PRC DOTMATRIX BW

PRD INKJET COLOUR

FOLDER MyFiles

5

Test1 TEXT

Photo1 IMAGE

Song1 AUDIO

MyStory TEXT

Panaroma1 IMAGE

SETDEFAULT PRD

PRINT Photo1 COLOUR PRA

PRINT Song1 BW

PRINT MyStory

PRINT Test1 COLOUR PRC

PRINT MyStory BW PRC

SETDEFAULT PRB

PRINT Photo1

PRINT Photo1 BW

PRINT Song1 BW PRD

PRINT Test1 BW PRC

END