

Software Requirement Analysis for Network Printer System

Project Team
Team 4

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Team Information

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3.2.4 Overall DFD

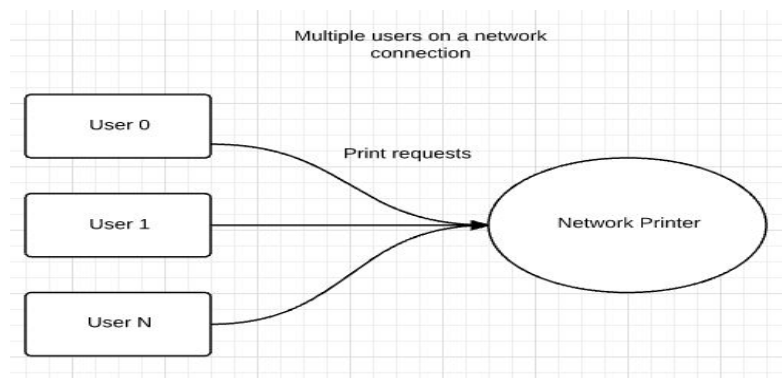
1 Introduction

1.1 Purpose

The purpose is to make a printer available to multiple users. The users are granted print authority by the Administrator, and can send print request to the printer. The printer provides the user with ink and paper status and will deliver a print result as long as certain requirements are met. Furthermore, simultaneous print request from multiple users are prioritised in chronological order to ensure efficient and logically functional printer.

1.2 Scope

A network printer is shared by multiple users.



The purpose of this class is to make a network printer system like the one above on a virtual environment. The printer must send data of its current state to the user, receive print data from multiple users and return a result by saving the return value in a print result file. All system must be in a SW format. The functions that need a HW are to be made virtually from SW modules.

1.3 Definition, acronyms, and abbreviations

PR-Print Request

SW-Software

RTS - request to send

1.4 Reference

Software Engineering 9th edition by Sommerville

2 Overall Description

2.1 Product Perspective

A virtual printer network system developed on C.

2.2 Product functions

The printer prints “.txt” files.

The printer can receive data from multiple users and return a printed result

The printer can show a preview of the printed data to the user

The printer can be stopped in the middle of printing

If the printer receives multiple requests in a short period of time, it prioritizes the requests in a chronological order

The printer displays the remaining amount of ink and paper to the user

The printer cannot print under certain circumstances

The printer consumes ink and paper proportionally to the amount of words printed

The ink and paper is refilled by the Admin

The Admin can add and delete user accounts

The Admin can see the user accounts granted access to the printer

2.3 User characteristics

User accounts can be created by the admin. They can also be deleted by the admin.

A single user account can send multiple print requests, and multiple users can send requests at the same time.

The user is given information of ink and paper amount upon request(or after sending a print

request)

The user cannot send files that does not exist and the files must be in .txt format in order for the printer to print

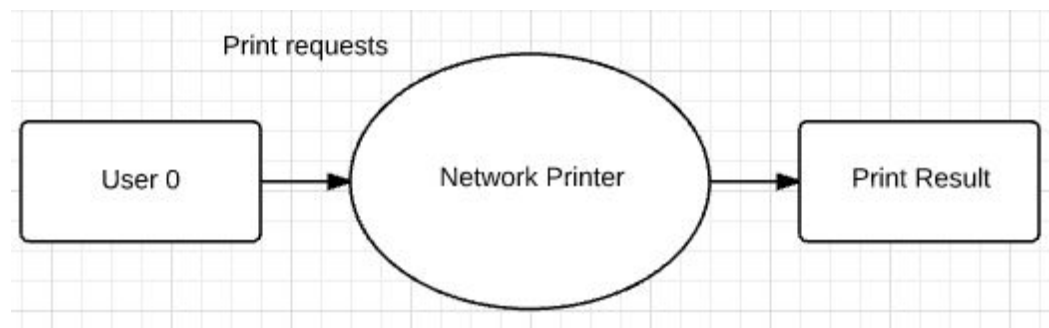
2.4 Constraints

All commands are executed through Cygwin and users cannot send nonexistent files.

3 Structured Analysis

3.1 System Context Diagram

3.1.1 Basic System Context Diagram

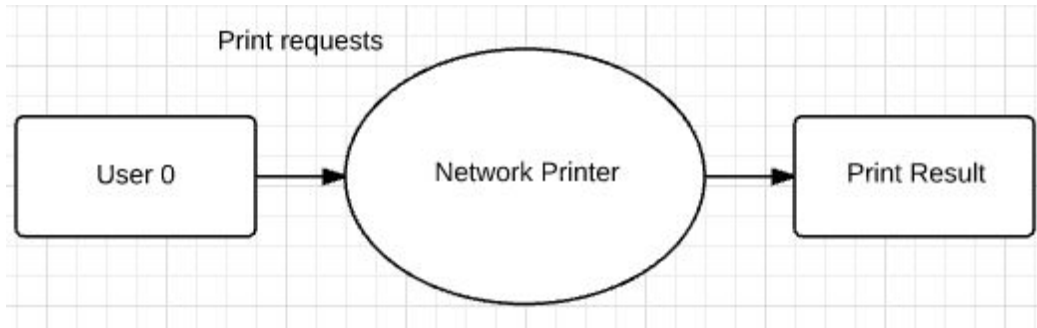


Terms	Definitions
User 0	The user console, sends print requests to the Network Printer to execute.
Network Printer	Receives Print requests and executes them by returning Print Result values.
Print Result	Result of network printer that has executed the print request sent from the User0.
Print requests	The data sent by the User0. It is the only input data the network printer receives from the User0.

3.1.2 Event List

Input/ output event	Description
Print request	A PR is send from the console to the printer.
Stop request	The printers “stop” button is pressed telling the printer to abort the current print job.
Print {Data}	Prints the send data.
Printer Status ‘Printing’	Displays the preview of the print request on the LCD screen.
Printer Status ‘Servicing’	Warns the user that the printer is currently undergoing servicing by the Admin by displaying ‘Servicing’ on the LCD screen.
Printer Status ‘Waiting’	Tells the user the printer is available for use by the displaying ‘Waiting’ on the LCD screen.
Show Print Preview	Displays the preview of the print request on the LCD screen.
Admin - register user {User}	User granted access to print
Admin - show user list	Displays a list of current registered users on the network printer in the console.
Admin - unregister user {User}	User deleted access to print
Admin - refill consumables	Admin refills consumable under command sending the printer into “Refill State”
Print error message - queue full	Displays error “Print queue full” on the LCD screen when a print request is received, and the print queue is full.
Print error message - Refill consumables	Displays error “Refill consumables” on the LCD screen when either the ink or paper level = NULL.
Print error message - unregistered user	Displays error “Unregistered User” when an unregistered user send a print request to the printer.
Save Print Result	The network saves the print result in the Paper tray folder.

3.1.3 The System Context Diagram

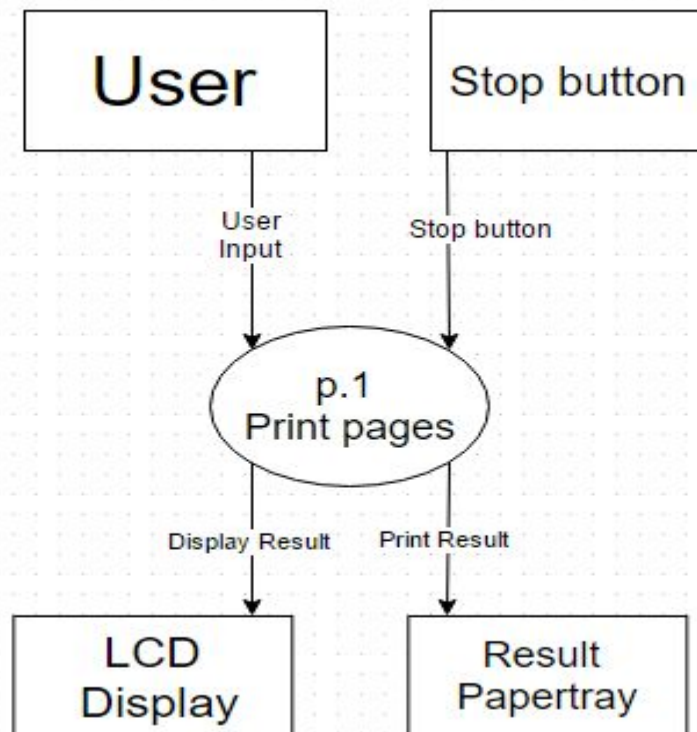


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3.2 Data Flow Diagram

3.2.1 DFD level 0

3.2.1.1 DFD

DFD level 0

3.2.1.2 Process Specification

Reference No.	p.1
Name	Print pages Process
Input	User Input, Stop Button
Output	Display Result, Print Result
Description	Receives User Input to trigger the print pages process and return the results of the User Input by displays it on the LCD screen and saving the printed results in Print Result Tray

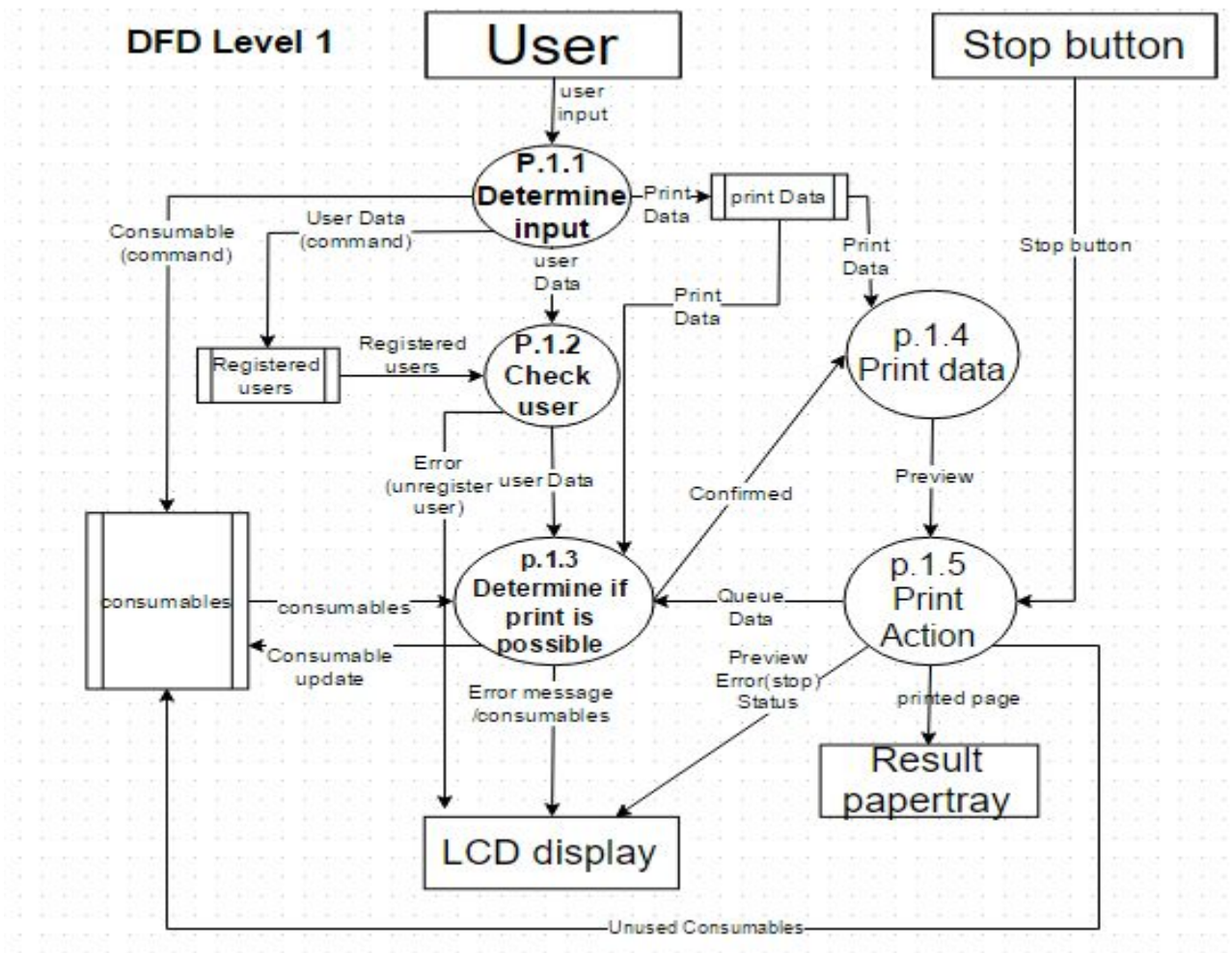
3.2.1.2.1 Data Dictionary

Terms	Definitions
User input	Sends print request data and user id to Print pages process.
Stop Button	Sends Stop Print to Print pages process.

LCD Display	Displays Error messages and other results.
Result Papertray	Saves finished print results.

3.2.2 DFD Level 1

3.2.2.1 DFD



3.2.2.2 Process Specification

Reference No.	p.1.1
Name	Determine Input
Input	User Input
Output	Consumable(command), UserData(command), user data, Print Data
Description	Identifies the different types of command and executes the appropriate command for the type of command. Command type input is used to update user list and consumables amount while user data and print data is used to initiate the print function.

Reference No.	p.1.2
Name	Check User
Input	Registered Users, User data
Output	Error Message, User data
Description	Compares the received user data with the registered user list to find a match. If not found returns the error message to the LCD display. Else sends the user data to p.1.3.

Reference No.	p.1.3
Name	Determine if Possible
Input	Consumables, User Data, Print Data, Queue Data
Output	Consumables Update, Error Message, Confirmation
Description	Calculates whether the print is possible by comparing the Consumables available to the consumables needed in Print Data, if there is not enough consumables, sends an error message to the LCD screen. It also manages the queue of print requests using a Print Queue data storage.

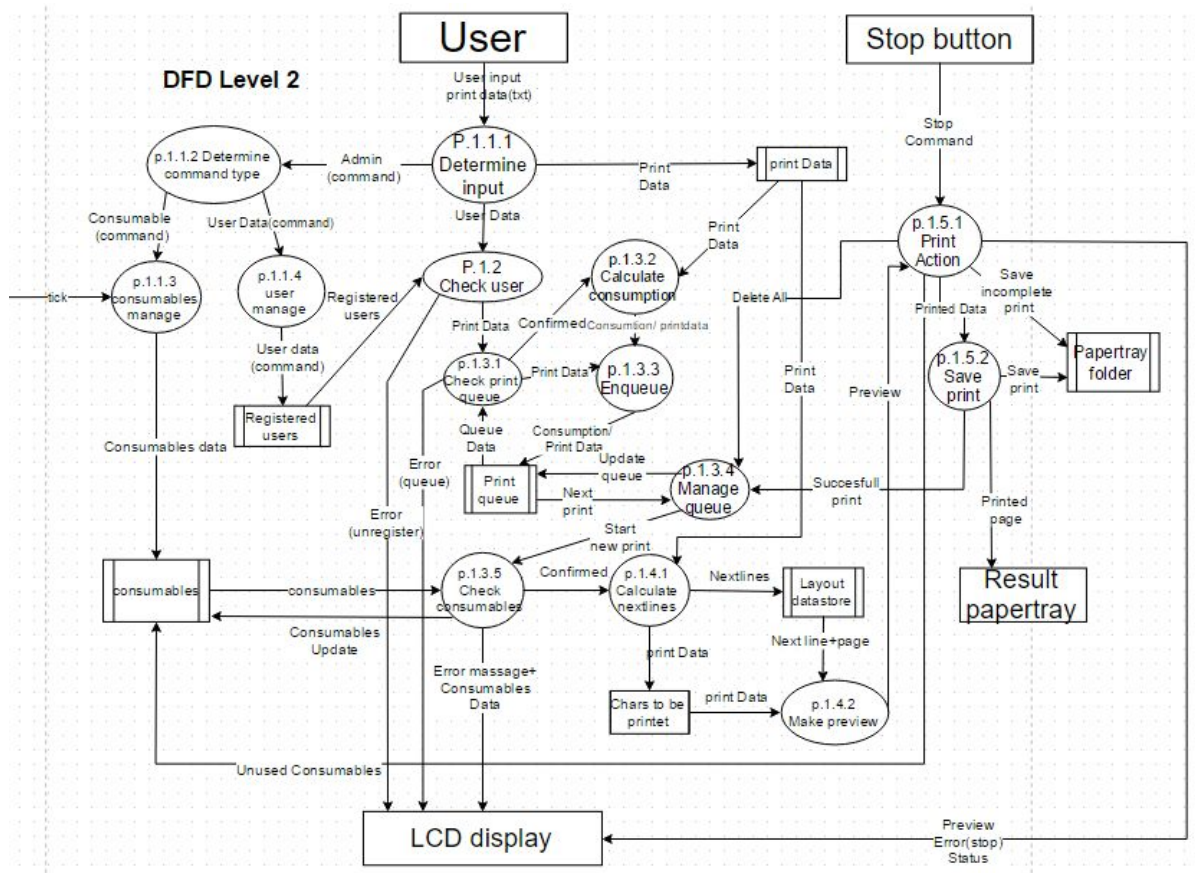
Reference No.	p.1.4
Name	Print Data
Input	Print Data, Confirmed

Output	Preview
Description	Makes the preview format from Print Data input when it receives confirmation.

Reference No.	p.1.5
Name	Print Action
Input	Preview, Stop Command, Tick
Output	Queue Data, Unused Consumables, Save Printed Data, Save Incomplete Print, Error Message
Description	Sets the time limit of the print request and when the stop button is not pressed within the time period, saves the result in the result papertray and updates the queue. If Stop Button Command comes within the time period, the process Deletes all queue, saves the incomplete print and updates the unused consumables.

3.2.3 DFD Level 2

3.2.3.1 DFD



3.2.3.2 Process Specification

Reference No.	p.1.1.1
Name	Determine Input
Input	Input from console
Output	Admin(command), User Data, Print Data
Description	Receives input directly from the console and determines whether the input is an admin(command) or a Print Request. If it is an admin(command), the input is sent to p1.1.2. If not, the User Data is sent to p.1.2 and the print data is stored in a Print Data datastorage.

Reference No.	p.1.1.2
Name	Determine Command Type
Input	Admin(command)
Output	User Data(command), Consumable(command)
Description	Determines the nature of Admin(command) input and triggers the corresponding process.

Reference No.	p.1.1.3
Name	Consumables Manage
Input	Consumable(command), tick
Output	Consumable data
Description	Updates the consumables available for printing process by inputting values in Consumables data storages.

Reference No.	p.1.1.4
Name	User Manage
Input	User Data(command), User List
Output	User Data(command)
Description	Edits the User List by sending in new User data or deleting existing user data on the Registered User data store and is returned the value of User list every time it sends an output to Registered User data store.

Reference No.	p.1.3.1
Name	Check Print Queue
Input	Print data, Queue Data

Output	Print Data, Error Message, Confirmation
Description	Receives Queue data to check if there is 5 print request in queue. If there is, sends an error message to the LCD. Else it sends the Print Data to p.1.3.3 and confirmation to p.1.3.2.

Reference No.	p.1.3.2
Name	Calculate Consumption
Input	Print data, Confirmation
Output	Print data/Consumption
Description	Receives the Print Data from Print Data storage and when it receives the confirmation from p.1.3.1, sends the calculated print data to p.1.3.3

Reference No.	p.1.3.3
Name	Enqueue
Input	Print data, Consumption
Output	Print data/Consumption
Description	Receives the Print Data and calculated consumption from p1.3.2. and p1.3.3 and saves the formatted data to Print queue data storage.

Reference No.	p.1.3.4
Name	Manage Queue
Input	Next Print, Delete All, Successful Print
Output	Start New Print, Update Queue
Description	Manages the output of Print Queue datastorage by invoking the next print requests and updating the queue based on the confirmation of successful print job and stop button.

Reference No.	p.1.3.5
Name	Check Consumables

Input	Start New Print, consumables
Output	Update consumables, Confirmation
Description	Receives data of how much consumables is needed in the Start New Print request, compares it with the current consumables available and returns an error message to the LCD if consumables are not enough, else sends a confirmation to p.1.4.1

Reference No.	p.1.4.1
Name	Calculate Next Lines
Input	Print Data, confirmation
Output	Nextlines, Char
Description	When the p.1.3.5 confirms there is enough consumables, this process calculates the number of lines and characters the print data has to print in order to finish the print request. Sends the calculated number of lines in a Layout datastore.

Reference No.	p.1.4.2
Name	Make Preview
Input	Print Data, Nextlines
Output	Preview
Description	Receives the page layout and characters to be printed in order to make a Preview of the print request.

Reference No.	p.1.5.1.
Name	Print Action
Input	Preview, Stop Button
Output	Delete All, Unused Consumables, Print Data, Incomplete Print
Description	Receives Preview and takes time required to finish the print. If time elapses for successful print without the stop button input, sends the Printed Data to p.1.5.2. Else, it sends an incomplete print to the Papertray Folder data storage, update input to the consumables data storage, and an error message to the LCD screen.

Reference No.	p.1.5.2.
Name	Save Print
Input	Printed Data,
Output	Save Print, Printed Page
Description	Receives Printed data from p.1.5.1. and saves it to the Papertray Folder and sends a confirmation to p.1.3.4.

3.2.4 Overall DFD

