

# Web Interface of Linux Print Server

Diane Palla  
Electrical & Computer Engineering  
Rutgers University

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# Agenda

- § Objectives & Goals of the Project
- § Methodology of Creating Print Server Web Portal
- § Results: Final Product
- § Conclusions and Future Research

# Purpose of Project

§ The project is to provide administrators and common users a web interface of the upcoming Linux print server for the ECS dept.

- Provide administrators a user-friendly online portal to execute operations like show status of jobs on printers, view accounting or status logs, configure the print server, prioritize printing order of jobs
- Provide regular users a user-friendly online interface to print a file, view the queue, their jobs

# Methodology of Completing Web Interface

## § Overall methodology: Software Development Cycle

- Requirements Analysis
- Design
- Implementation
- Testing



# Requirements Analysis

## § Use Case Diagram

- Functional requirements of a system can be specified with a pictorial representation such as a use case diagram. \*One for this system is presented next.
- A “use case” is the functional requirement.
- An “actor” is the user who would perform such use on the system.

## § Use Case Descriptions

- Written Qualitative Descriptions of a use case

## § General System Requirements

- User-friendliness
- Aesthetically pleasing look
- Accommodates most significant needs of the administrator and common user



# Design: First Step, Transforming Requirements to a Plan

## § System Sequence Diagrams

- Transforms Use Cases to User-System Interactions and Flow Control

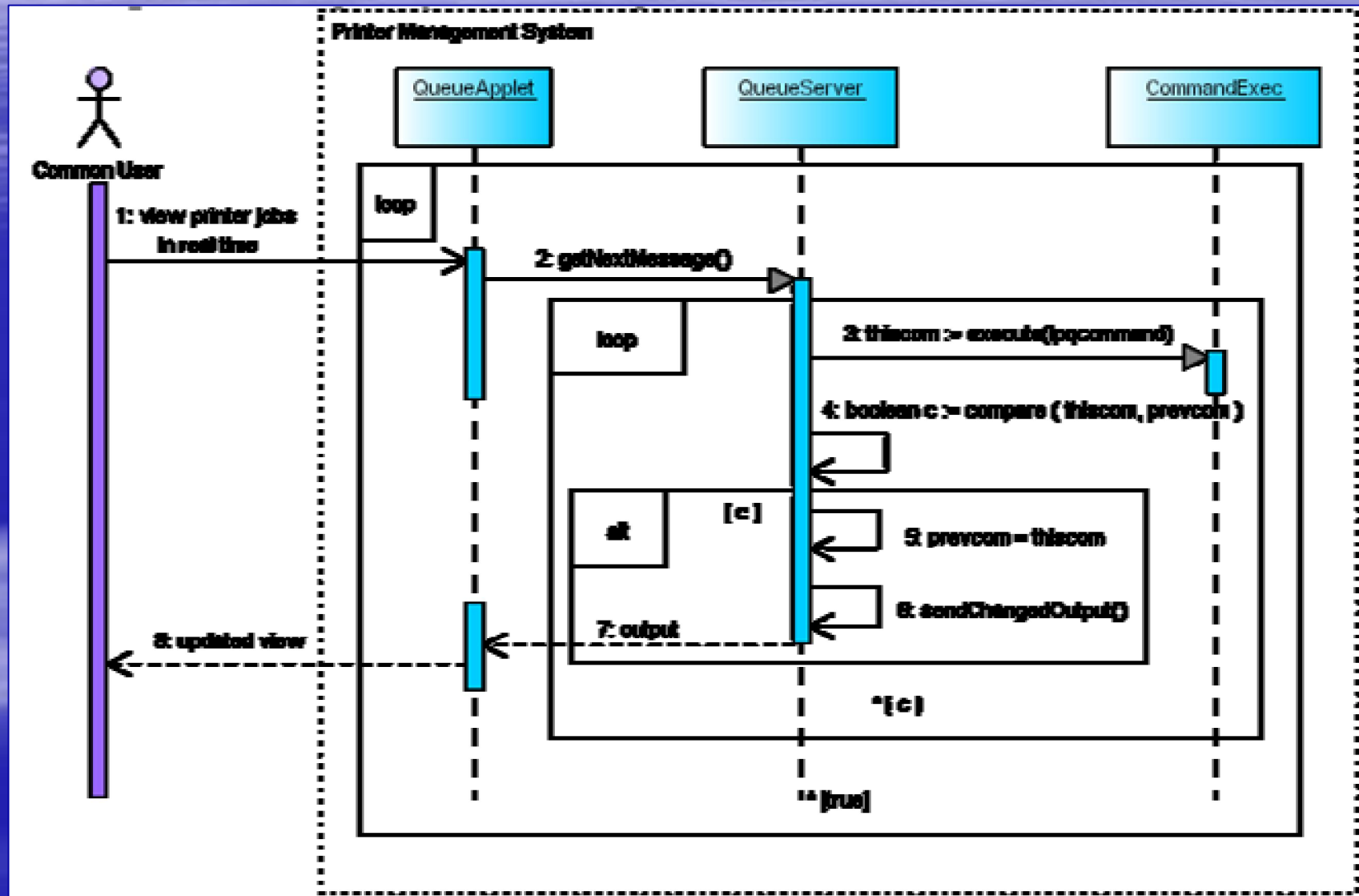
## § Object Design: Java Class Layout

- Guidelines

- § High Cohesion, meaning specialization

- § Model-View-Controller Design Paradigm

# System Sequence Diagram for Use Case: View Queue in Real Time





# Design: Model-View-Controller

## § Model-View-Controller Design Concept

- Model – Represents the state and data of application
- Controller – Handles the events that affect the model or views, processes using the business logic of application
- View – the display of all or portion of the data, what the user can see, e.g., the web page with buttons, display boxes

# Design: Object Design Layout

- § CommandTrans: Controller Responsible for translating the request of the user into a Linux bash command
- § CommExec: Model/Controller Responsible for executing command and returning command output
- § CommView: View Responsible for providing view of command output
- § Genhtmlapplet: View and Processor responsible for providing a real-time view of a general command

# Design: Object Design Layout (cont.)

- § Lpqhtmlapplet, lpqQueuehtmlapplet: extensions of genhtmlapplet responsible for view of
  - § Printer & Their No. of Jobs: “lpq -sa”
  - § Printer Queues: “lpq”
- § Genhtmlservlet: Controller responsible for providing genhtmlapplet with command output
- § Lpqhtmlservlet, lpqQueuehtmlservlet: extensions of genhtmlservlet responsible for providing command output of
  - § Printer & Their No. of Jobs: “lpq -sa”
  - § Printer Queues: “lpq”

# Design: Web Layout

## § Web Layout Design

- Web Layout follows from specifications. Must be User-friendly and aesthetically pleasing.
- Login Page for both portals come up by default if user is not authenticated.
- Admin Web
  - § Admin Home Page with a menu to the following
    - § Admin Logs and Status Page
    - § Queue and Job Admin Page
    - § Real-time view of Printers & Their No. of Jobs
- Common User Web
  - § Common User Home Page with a menu to the following
    - § Print Job Management Page for Common User
    - § Real-time view of Printer Queues



# Implementation

- § Installing and Configuring Tomcat
  - Installed JDK 1.4.2, Servlet 2.3 classes
  - Added servlet and Realm capability in configuration files: server.xml and web.xml
- § Installing MySQL, creating database, loading test data

# Implementation: Programming CommExec

- § `Runtime.getRuntime()` returns the current runtime object for that particular program.
  - `Runtime runtime = Runtime.getRuntime();`
- § `Process p = runtime.exec(command)`  
where `command` is a string.  
This executes a command and returns the process under which it is running.
- § To capture the command output, the input stream of the process associated with the command gives the command output.

# Basic Outline of Program for Command Output Fetching

```
commExec(String command) {  
    Runtime runtime = Runtime.getRuntime();  
    Process p = runtime.exec(command);  
    BufferedReader in = new BufferedReader(new  
        InputStreamReader(process.getInputStream()));  
    String outputLine = null; LinkedList l = new LinkedList();  
    Do {  
        outputLine = in.readLine();  
        l.add(outputLine);  
    } while (outputLine!=null);  
}
```

\*Use try/catch around all for IOExceptions

# Implementation: CommView and its Approach to Format Command Outputs

- § commgetbyLine(LinkedList l, boolean  
formatdouble)
  - Returns a string with one or two “<BR>”  
between each line stored as a element in  
LinkedList



# Implementation: CommandTrans

## § CommandTrans

- Depending on request, creates command string to send to `commExec.exec(command)`;
- Some print commands:
  - § `Lpc -a status` - shows jobs' status of all printers
  - § `lpc status printername` - shows jobs' status of printer
  - § `Lprm -Pprintername jobid` - remove job from printer
  - § `Lpc topq printername jobid` - move job on printer to top of queue
  - § `Lpc redirect srcprinter destprinter` - redirect jobs to printer
  - § `Lpq -sa` - outputs short form of jobs' status for all printers

# Implementation: Authentication

- § Implemented realms for the authentication of Users and Security Constraints, features that Tomcat 5.0 offers
  - A **Realm** is a "database" of usernames and passwords as well as a list of *roles* associated with each valid user for the use of authentication for a web application.
  - One can configure Tomcat to authenticate users at login and check given usernames/passwords against the database via a realm.
  - Security constraints in Tomcat can be set to only allow users with a particular *role* to enter parts of or the entirety of the web application.

# Testing and Final Product


Administrator's Main Page - Operations - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Preview Print Stop

Address T:\My Documents\DianeWeb\index.html Go Links

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## Administrator's Operations

Pick an **Operation** and the **Printers** for which you want perform the action on, and click the **Retrieve** button.

Status	Logs
<input type="radio"/> Summary Status of Selected Queue <input type="radio"/> Summary Status of All Queues <input type="radio"/> Status of Jobs in Selected Queue <input type="radio"/> Status of Jobs in All Queues	<input type="radio"/> Accounting Log File of Selected Queue <input type="radio"/> Status Log File of Selected Queue

### Printers

☐  
☐

**Retrieve**

# Conclusions and Future Research

- § Web Interface successfully serves to provide common users and administrators with the ability to view and manage print server.
- § Future Research:
  - Add menus and any remaining web pages
  - Iterations of improving the system, adding or changing features to fit all users' needs
  - Adding further security, e.g., SSL