Proposal: Campus-wide Implementation of PrintiFy Smart Printing Hub at IUB

Submitted By:
Yusa Islam
ID: 2210118
Department of Computer Science and Engineering
Independent University, Bangladesh (IUB)

1. Introduction

PrintiFy is an intelligent, student-focused printing system developed entirely within FabLab IUB. It allows students to upload documents via a web platform, configure print settings, and retrieve printouts from RFID-enabled print booths. The system integrates cloud storage, queue management, and a points-based billing model. This proposal outlines the complete vision for PrintiFy as a fully deployed, university-wide service empowering students with fast, affordable, and autonomous printing across the IUB campus.

2. The Problem: Current Campus Printing Challenges

Currently, IUB students face significant inconvenience when it comes to printing academic or administrative documents. There are only two practical options available on campus, both of which suffer from major limitations:

1. **CIITS (Central IT Services):** This facility offers the cheapest printing cost at ৳1 per page. However, it operates with only one printer for numerous computers, which leads to long queues and significant delays. Students frequently have to wait extended periods or return without getting their documents printed, especially during exam seasons or project submission days. Additionally, CIITS operates on limited hours, making it inaccessible during weekends or after office hours.
2. **Jalil Shop (Campus Store):** While this option is faster and allows for immediate printing, it is significantly more expensive costing between ৳10 to ৳20 per page. This imposes an unfair financial burden on students, especially those who need to print large reports or multiple assignments. Furthermore, it relies on a single computer and printer with an operator, which still causes queues and occasional service disruption.

These current systems are inefficient, costly, and time-consuming and they do not reflect the standard of convenience or digitalization expected at a modern university.

PrintiFy addresses all of these issues:

- It decentralizes printing by installing smart booths in each department.
- Students can queue jobs remotely and pick them up with minimal delay.
- RFID login removes the need for manual verification or queues.
- The point system maintains affordability while promoting fair use.

By digitizing and automating the printing process, PrintiFy aligns with IUB's goals of fostering innovation, enhancing student life, and reducing administrative load.

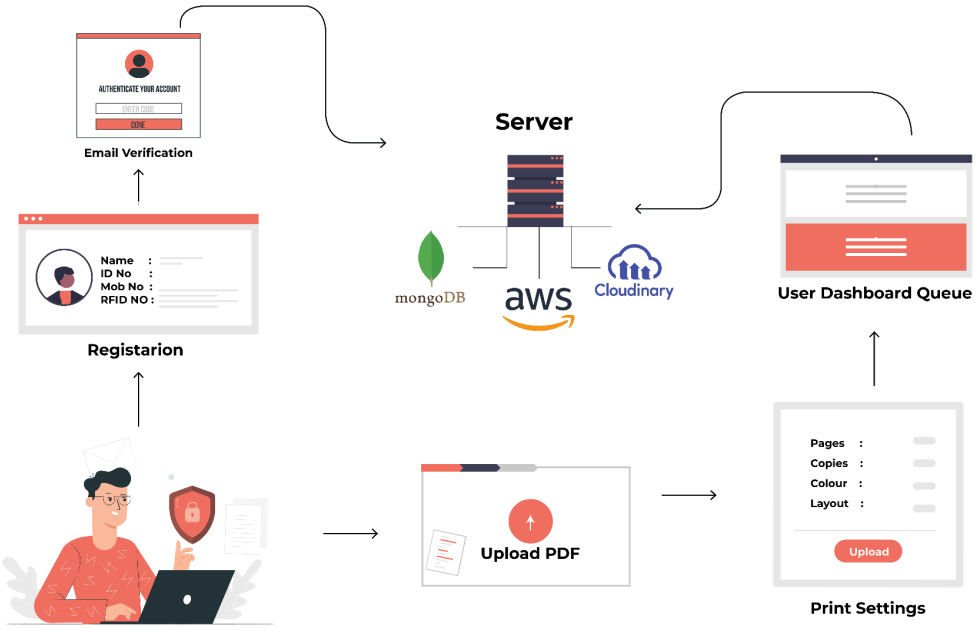
3. Project Description: How PrintiFy Works

PrintiFy is a modern, fully automated university printing system designed to replace the current manual and time-consuming printing methods. Here's how it works:

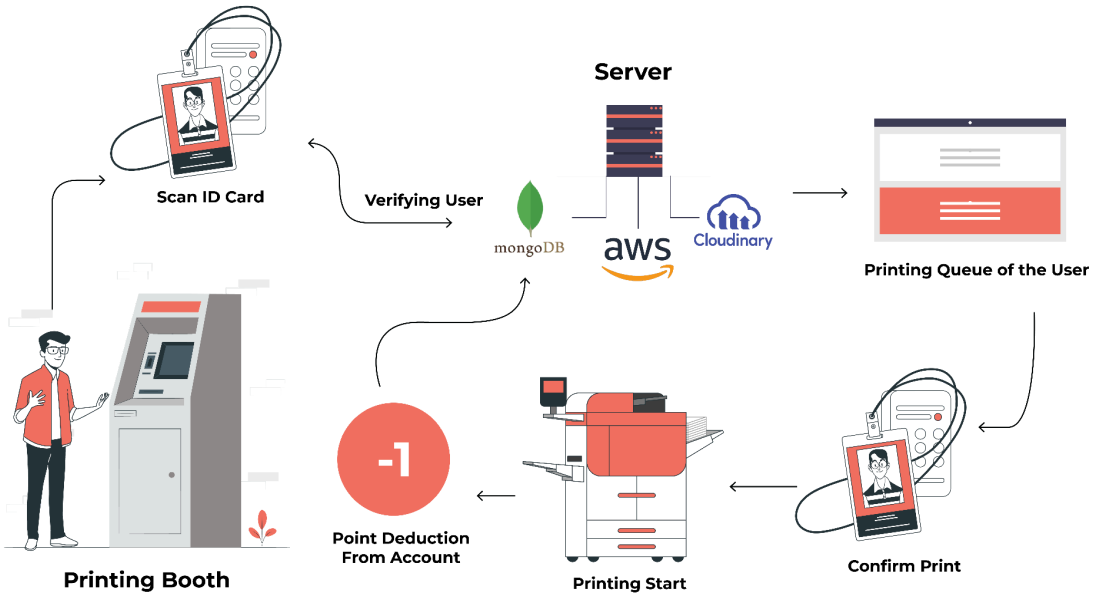
1. **User Registration & Authentication:**
    - IUB students create an account on the PrintiFy website by registering with their IUB email, name, student ID, RFID card number, and password.
    - Upon registration, they receive an email verification link to activate their account. Login is required to access the dashboard.
2. **PDF Upload & Print Settings:**
    - Students upload their PDF files through the web portal.
    - They can specify settings such as number of copies, page range, single/double-sided printing, and paper layout.
    - Files are securely stored in the cloud (Cloudinary) with access limited to the student and system admin.
3. **Print Queue Management:**
    - Each submitted job is placed in a personal print queue visible in the user dashboard.
    - Jobs are classified by status: pending, in-progress, completed, or canceled.
4. **Point System & Top-Up:**
    - Students receive 30 free points per semester. Each point equals one printed page.
    - Additional points can be topped up via bKash API with automatic approval.
    - If a user does not have enough points for a job, they will be notified.
5. **Printing Hub & Execution:**
    - Print booths will be set up in each department, with a mini Windows PC, a connected printer, and an RFID reader.
    - Students scan their RFID (IUB ID) at the booth to view their print queue.
    - Upon selecting a job, it is fetched directly from Cloudinary and printed instantly using the configured settings.
    - The system automatically deducts the appropriate number of points and marks the job as completed.
6. **Admin Dashboard Capabilities:**
    - **User Management**
        - View all users, approve, reject, block, or delete users.
        - Approve or reject new signups.
        - Reset and manage student points.
    - **Print Job Management**
        - View and monitor all print jobs.
        - Change status, approve/reject/cancel jobs.
        - Download or preview uploaded PDFs.
        - Assign/re-assign jobs.
    - **History & Analytics**
        - Track user print histories and overall trends.
        - View system logs, point usage, and print audit trails.

3A. System Workflow Overview (Visual)

Below are two visual diagrams illustrating the PrintiFy system's key processes:



Registration to Upload Process
This diagram outlines the student's journey from account registration to file upload, highlighting database and cloud storage flow.



Print Booth and Output Workflow
This illustration shows how a student retrieves and prints their queued file using RFID authentication at the booth.

3B. Related Technologies and Existing Solutions

To provide context for PrintiFy, here are some existing commercial printing solutions with similar functionalities:

- **PaperCut MF**: A popular print management solution used by many universities. It supports RFID login, print quotas, secure printing, and detailed analytics. However, it requires paid licensing and commercial hardware.
- **HP Access Control Smart Printing**: Offers secure job release using employee ID cards. Common in enterprise environments but costly and not tailored to academic flexibility.
- **Ricoh Smart Printing Solutions**: Corporate-grade printing infrastructure offering secure printing via card authentication. Best suited for office environments and not optimized for student self-service.
- **PrinterOn Education**: A mobile and cloud printing service deployed in some international campuses. It supports web uploads and campus kiosk-based retrieval, but it's subscription-based and lacks full local control.

What Sets PrintiFy Apart:

- **Student-Centric Design**: Built specifically for IUB's academic and student printing needs.
- **Cost-Effective**: No per-page cash charges; point-based system with semester top-ups.
- **In-House Development**: Open source and built-in FabLab IUB, ensuring customizability.
- **Affordable Hardware**: Compatible with mini PCs and basic RFID readers unlike commercial solutions.
- **Seamless Workflow**: Combines dashboard uploads, RFID-based booth pickup, and cloud processing.

4. Objectives of Full Implementation

- Empower all IUB students with anytime, anywhere access to printing
- Eliminate queues, delays, and financial stress around printing
- Automate and decentralize print services across campus
- Enable data-driven management of campus printing with admin dashboards

5. Proposed Deployment Scope

- **Print Booths:** One installed in **each department**
- **Target Users:** All current IUB students with a valid RFID ID card
- **Implementation Timeline:** Flexible, based on administrative approval and procurement

6. PrintiFy Features Overview

- **Web Portal:** Students upload PDFs, set print preferences, and track print jobs.

- **Point System:** 30 free points per semester; 1 point = 1 page. bKash-based top-up supported.
- **Print Booths:** RFID-enabled terminals in each department with secure print access.
- **Admin Panel:** Manage users, jobs, and analytics.
- **Cloud-Based Storage:** Files stored securely via Cloudinary.
- **Security:** JWT-authenticated API access, CORS policies, and error logging.

7. Institutional Support Requested

To successfully deploy PrintiFy across IUB, the following support is requested:

- Allocation of physical space in each department for booth installation
- Budgetary provision for:
    - Mini Windows-compatible PCs
    - Printers (preferably B/W laser)
    - RFID card readers
- Internet and electrical connectivity at all booth locations
- Access to RFID authentication using existing IUB student ID infrastructure
- Coordination with CIITS and IT Services for initial tech support and maintenance

8. Success Measurement & Evaluation Plan

- **System Reliability:** 95%+ booth uptime during working hours
- **Adoption & Engagement:** Number of users, uploaded files, and completed prints
- **User Satisfaction Feedback:** Collected through online surveys
- **Operational Insights & Logs:** Real-time error tracking and audit logs
- **Time & Cost Efficiency Gains:** Comparison with CIITS/Jalil shop workflows

9. Supervision and Oversight

The implementation will be supervised by:

Dr. Mahady Hasan
Associate Professor, Dept. of CSE
Director, Automation, IUB
Director, FabLab IUB
School of Engineering, Technology and Sciences

10. Conclusion

PrintiFy is ready to serve as the official smart printing solution for the IUB community. With this proposal, we seek the university's support to deploy PrintiFy across all departments enabling fast, cost-effective, and autonomous printing for all students. Developed within IUB by FabLab, this system represents a scalable, student-centered solution that modernizes campus printing services for years to come.

Contact:
Yusa Islam
ID: 2210118
Email: yusaislam48@gmail.com
Phone: 01701053959
Department of CSE, IUB