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File Tracking System for University of Kashmir: Design Guidelines and Model Implementation

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Abstract

With an objective to develop and implement a file tracking-system for the University of Kashmir, this paper proposes a project based implementation of File-Tracking System. It explains design, development, and implementation strategy that can be adopted to implement a web-based file-tracking system for University of Kashmir. It reviews existing file flow system in the University of Kashmir, discusses proposed file-tracking system and its working. Through a design outlay, this document gives an insight about its working including user screens, roles of users and reports. It discusses why existing file-tracking systems that are in place at various government organizations are not suitable for the University of Kashmir. The document gives guidelines for successful implementation of the system including employee training and its phased implementation. The system when implemented shall improve efficiency and effectiveness of the existing system, consistency of file records, resource management, and quality of administration. It will establish transparency and accountability and thereby will help to reduce turnaround time, and processing delays of files. The system will pave a way towards adoption of complete e-governance wherein paperless file processing and its tracking is possible. Such a system is already in place at reputed Universities and Institutions.

Keywords: File Tracking System; FTS; e-Govrnance

1. Introduction

File Tracking System (FTS) also called File Tracking and Monitoring System (FTMS) is a web-based application to monitor the movement of files and receipts and assist in their easy tracking. Its features include generation of receipts and files, updating its status, opening of new files, tracking the movement of files, dispatching letters/files, recording their track, etc.

With the emergence of e-Governance wherein among other applications, applications for electronic office such as e-Office application, which besides keeping track of files recorded also replaces physical files by electronic files, limited application of FTS exist. However, in situations where organizations do not possess adequate hardware/software resources or have inadequate trained human resources, FTS still finds application. In contrast to electronic office where all officers and officials must possess adequate computing skills and hardware/software resources, FTS requires minimum hardware/software resources and some trained human resource. For implementing FTS in an organization, no radical change is required in its existing functioning. Further to implement e-Office, several pre-implementation steps are required e.g. unstructured file formats have to be converted into highly structured formats, and adequate hardware and software tools have to be procured. Further, existing files have to be converted into electronic files and all human resource have to be trained in the use of computers. File Tracking System is a step in the direction of realizing the concept of paperless office. Several educational institutions such as Jamil Millia Islamia (JMI, 2010), New Delhi,

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NIELIT (NIELIT, n.d.), New Delhi, India have already installed File Tracking Systems. Some of these have developed in-house solutions for e-filing while as others have hired the services of private companies to develop such systems.

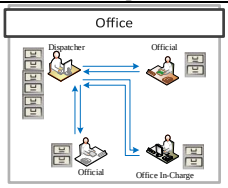
2. Background Study

National Informatics Centre (NIC) of Government of India has made File Tracking System (FTS) (NIC, n.d.), Centralized File Movement, and Tracking Information System (CeFMaTIS) (NIC, n.d.) to monitor the pendency of receipts and files and assist in their easy tracking. It is based on the Manual of Office Procedure and is a system for Government/Semi-Government offices and public sector organizations. The product supports the complete electronic file movement with encryption of content and digital signature. The FTS and CeFMaTIS have been implemented in over 70 government Departments. DAILY RFID Co. Limited has launched a RFID file tracking system in October 2010, which enables automated gathering and sending of document information. The systems enable users to easily locate, inventory and check in or out file movement. This system integrates RFID labels, multi-tag RFID reader, and necessary software to allow organizations to manage document efficiently. The UHF RFID label on each document permits to store location and time of a document (DRCL, 2010). In addition to these, several private software development companies and open source communities offer file-tracking systems. These include University ERP (Expedien, University ERP, n.d.), Virmati (VSTL, n.d.), 3M-RFID File Tracking System (3M T&TS, 2008), File-Coder (FILETACTICS, n.d.), DFTS- Dolphin File & Document Tracking System (DRPL, n.d.), cuteflow document circulation and workflow system (Haberkern et al, 2009), OpenDocMan™ - Open Source Document Management System (OpenDocMan, 2015), File Tracking & Tracing (ROPARDO S.R.L, n.d.), and Openkm-Open Source Document Management (OpenKM, n.d.).sMost of the currently available web based file-tracking solutions are mainly focused on storing a digital copy of files and monitoring changes to the contents rather than tracking their movement alone between various offices of an organization. Some of these applications are provided as Software as a Service (SAAS) wherein the data and the application is stored on some third party servers. The organization using such services do not have any control on these services. Other open source and freely available solutions are not stable, often lack in community support, and have no technical documentation thus making them unreliable and risky for large organization like universities. Further, the feature set offered in ready-made file-tracking systems is comparable to each other; however, they are not designed to the specific requirements of a particular organization.

3. Existing System

The University offices include PG Departments, Directorates, and Research Center offices, which are distributed throughout University campuses. Other offices are Administrative offices, which are mostly in the Administrative block of the University. Every office maintains dozens of files housed within them to maintain records in categorized manner. As depicted in figure 1 below, the system involves several types of entities including users who perform different activates within the system. These include “File”, “Officer”, “Office”, “Official”, “Dispatch Register”, “Dispatcher”, “Employee”, “Student,” and “External User”.

Table 1. Entities Involved in the Current System

Entity and its Functions
 File A File is a related collection of data, which may contain information on a single sheet of paper or multiple sheets of papers. As the file passes from one office to another office, officers and officials mark comments, remarks, and decision on it. This may also involve movement of another office file that will help officers and officials to mark comments, remarks, and decisions on it. Files may be categorized based on their term as well as based on its nature. Based on their term, files may be long-term files that are stored in a particular office and short-term files that are disposed off by merging them with some long-term file after taking decision on them.
 Officer Chamber Officers are University Employees such as Vice Chancellor, Dean Academic Affairs. Registrar, Dean Research, Deputy Registrars, Assistant Registrars, and Section Officers. These officers except section officers sit in their office chambers, which are physically isolated from their offices. Often one officer processes files originating from different other offices.
 The composition of University offices irrespective of their type are housed in a single or multiple rooms. Deans of Various Faculties, Heads of various Departments, Directors of various Centers, etc. are office in-charges of these offices. The office staff includes section officer, head assistants, senior, assistants, junior assistants, dispatchers, etc. Each office has sets of files that are used to record various activities pertaining to that office. Often responsibility and custody of files are distributed among officials working in an office. Dispatcher maintain dispatch and receive registers and peon book.
 Dispatch Registers These are specially designed printed with columns wherein some information about the file such as its subject, date of movement, etc. is recorded. A record is added in a dispatch register, every time a file moves in or out of a particular office. These registers also serve as a receipt register.

Entity and its Functions	
 Employee	University employees include faculty members, officers, officials, etc. who may or may not be an officer. They may create files (notes, applications, proposals, etc.) which are moved from one office to the other office for their disposal. They either submit their files in their native office or other offices of the University for further necessary action.
 Student	Students including scholars submit applications, grievances, forms, and other documents at various University offices, which are also moved from one office to another office. Currently, such documents are not tracked at University offices. Receipts for their submission is given in rare cases.
 External User	External users are persons from outside the University of Kashmir. They submit proposals, tenders, applications, and other files at various University offices for further necessary action. These documents are not tracked, however, receipts of there is given in some cases.

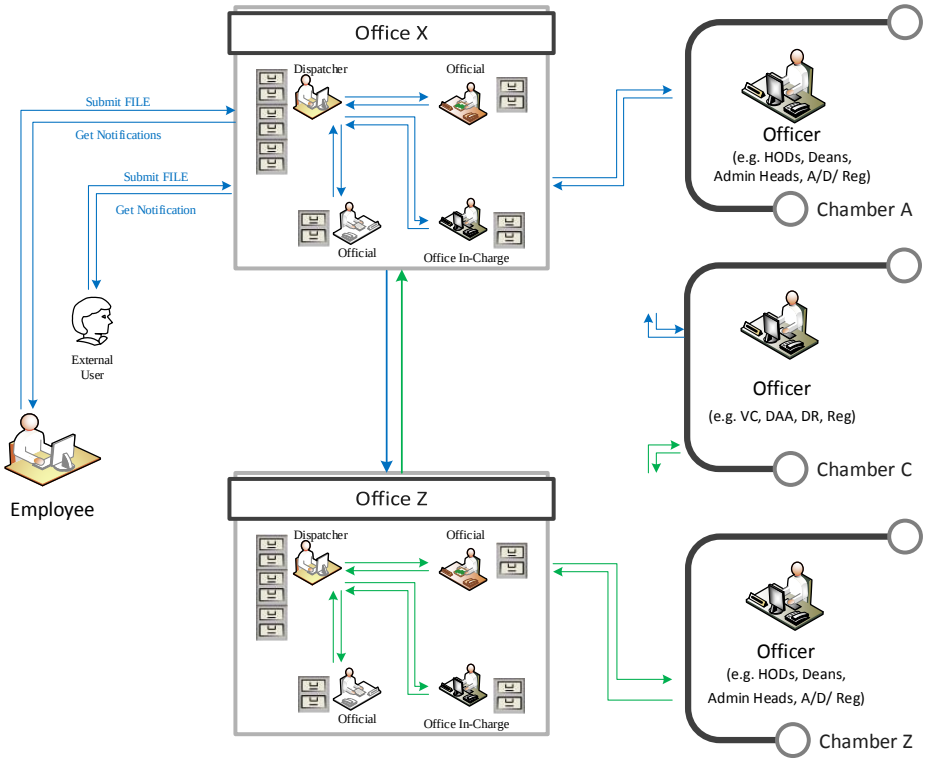


Fig. 1. File movement in the existing system

New files of diverse types are submitted by external and internal users that include University employees, Students, Heads of various Departments, Deans of various Faculties, Directors of various Centers, Coordinators, and Principal investigators of various projects, etc. Irrespective of the type of the office, these files pass from one official/officer to another official/officer within same or different office. A file track within the same office is usually not maintained, however, currently, University of Kashmir has a manual file-tracking system, wherein each office has a dispatcher who manually records track of each file moving in and out of the office. For this purpose, offices such as Departmental offices are maintaining a single dispatch register while as some offices such as administrative offices maintain multiple dispatch registers. A dispatcher in the office records minimum file particulars on the dispatch register, which is carried along with the files to be moved to another office by a peon. The peon delivers the files to the dispatcher of the other office who records these files in his dispatch register and signs the entries on the dispatch register of the sending office. This manual system of file record maintenance is inefficient as it provides very limited capability to track file especially in situation wherein in and out flow of files is huge. The system involves marking of multiple manual entries in dispatch registers for files at each passing office and no information about the status of the file is maintained. Reports about file receive and dispatch transactions, file status, file log, etc. are not possible in the current system. Figure 1 shows the file movement in the current system.

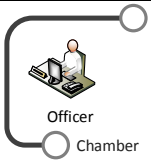
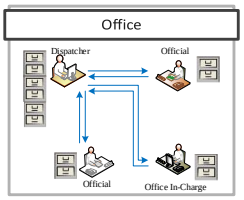
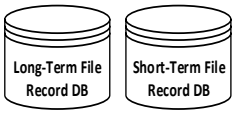
4. Proposed System

The proposed file-tracking system will not disturb the existing file movement system; however, file dispatch and receive procedures will be computerized. Electronic records for existing files (Long Term files) as well as new files will

be created to track their movement. There will be no change in the existing work system. University community as well as external users will be able to get information about the position of their file(s).

The proposed file tracking-system will involves all entities of the existing system except dispatch registers, which will be replaced by electronic File Database. In addition to them, it will require "Super Administrator", "Auditors", and "Administrators". Each type of user will be assigned specific roles to maintain the system. To ensure role based security, after deployment of the system, IT experts, advisors, programmers, etc. involved in the design and development of the system will have no control on the functioning of the system. The system will be exclusively controlled by Super Administrators. However, there will be scope of improvement and future modification. Table 2 shown below briefly defines involvement of each entity used in the proposed system.

Table 2. Entities involved in the proposed system

Entity and its Functions
 File — Files as in the existing system will comprise of single or multiple sheets of papers, which will be moved from one office to another office. The files will have a unique identification number generated at the time of their creation. Records of the existing files (long-term files) stored within University offices will also be created.
 Officer Chamber — The officers of the University such as Vice Chancellor, Dean Academic Affairs. Registrar, Dean Research, Deputy Registrars, Assistant Registrars, will perform their activities as they are performing in the existing systems. However, they can optionally inquire about file status (e.g. files currently put for their Table 2remarks, comments, and disposals). Some of the officers will be involved in the audit of files and administration of the file-tracking system. There shall be no change in their current method of working or additional burden on them.
 — A list of all offices of the University shall be created in the system. A record of the office files i.e. the long-term files stored in the office shall also be created. This is a list of files along with their purpose. Office in-charges such as Deans of Various Faculties, Heads of various Departments, Directors of various centers, etc. shall function as they are functioning in the current system. However, they will be able to keep track of the files that pertain to their offices. They will also manage dispatchers working in their offices and their profiles. They can optionally create file records, dispatch, and receive priority and confidential files. Dispatchers will record file transactions using the proposed file-tracking system.
 — The Dispatch registers will be replaced by electronic dispatch registers, which will be maintained primarily by the dispatchers. Dispatchers can maintain internal movement of files (movement of files within the office) as well as external movement of files (movement of files from one office to another). They will also be able to maintain the file transactions involving officers located in their respective office chambers.
 Employee — University employees who want to submit their files for processing may create file record themselves and submit the file through dispatcher in the concerned office who will in turn send the file for processing and record the transaction. In case the employee submits the file without creating its record, the dispatcher will create its record before further processing it. The employee can online track the file movement and remarks put on them.
 External User — External users will submit their files to the concerned dispatcher of the office, who will create its record and send it for processing after recording its transaction. A file submission receipt and password will be generated by the system, which will be subsequently used by the user to inquire its status online. Students will be treated as external users in the proposed system.
 Auditors *(Appointed by S. Admin)* — Auditors will be appointed by Super Administrator (such as Registrar of the University). Auditors will have access rights to inquire about file movement of every files (or group of files). They will be able to generate diverse types of reports from the system. They will also receive system-generated triggers for files that are moving slow than expected. They will be able to generate reports about all types of users including super administrators and their activity in the file-tracking system. Complaints and grievances can be resolved easily by administration based on auditor's reports.
 Administrators *(FTS Committee Members)* — Administrators will be appointed by Super Administrator (such as Registrar of the University). The administrators will have full control on the system but their activity will also be recorded and visible to auditors and super administrators. They will be able to perform any operation in the system. However, their primary responsibility will be to create office in-charges and maintain their profiles and roles. They will also be able to carry out certain special functions on file records, which other types of users are not, allowed to perform.
 Super Administrator *(Registrar)* — Super Administrator role is the highest in the system. Registrar, being the in-charge of entire Registry can be the super administrator in the proposed system. He can carry out any operation in the system, however, his primary role in the system will be to appoint and maintain administrators and auditors and set their roles. Vice Chancellor of the University will also be able to log on to the system as super administrator; however, he will primarily use it for monitoring and evaluation.

File creation will be done by the University employees including office in-charges of various offices as in the previous system. However, before dispatching the file for processing an electronic record of the same shall be created. In case the submitter is a University employee, the electronic record can be created by the submitter. Otherwise, the dispatcher will create the record and dispatch the file to respective quarter after creating its dispatch record. The file along with other files will be pilled and send physically for processing within same office or to another office. In case the files are send to another office, which has a dispatcher, the files will be received by the dispatcher and file record accordingly modified. At each stage of dispatch and receive appropriate comments will be entered by the dispatcher in the respective column. In case the file is send to an officer/official within the same office, the dispatcher may or may not record this file transaction depending upon the instructions and policy adopted by the University. As the file is processed, it may grow in the number of pages; this will also be updated by the concerned dispatcher. File records will available online for viewing by file submitters who can generate different types of reports depending upon their roles in the system. The functioning of the proposed system is depicted in figure 2 below.

Table 3 (given at the end of this paper), lists roles and operations that a particular group of users can carry out in the proposed system. Every user group except external users shall have a user profile that can be updated by the user himself. Users with higher privileges in the system shall be able to manage the users immediately below their privileges. To carry out their role in the new system, higher privileged users can authorize lower privileged ones. They can also block them. Super administrators can administer all user accounts and authorize or block any user; however, they shall ordinarily be required to manage administrator roles only. They will also block external users in case it is required. Administrators shall manage roles of office in-charges who in turn shall manage roles of dispatchers and employees working in their respective offices. Office in-charges will also manage the profile of their respective offices and edit or add long-term or short-term file records.

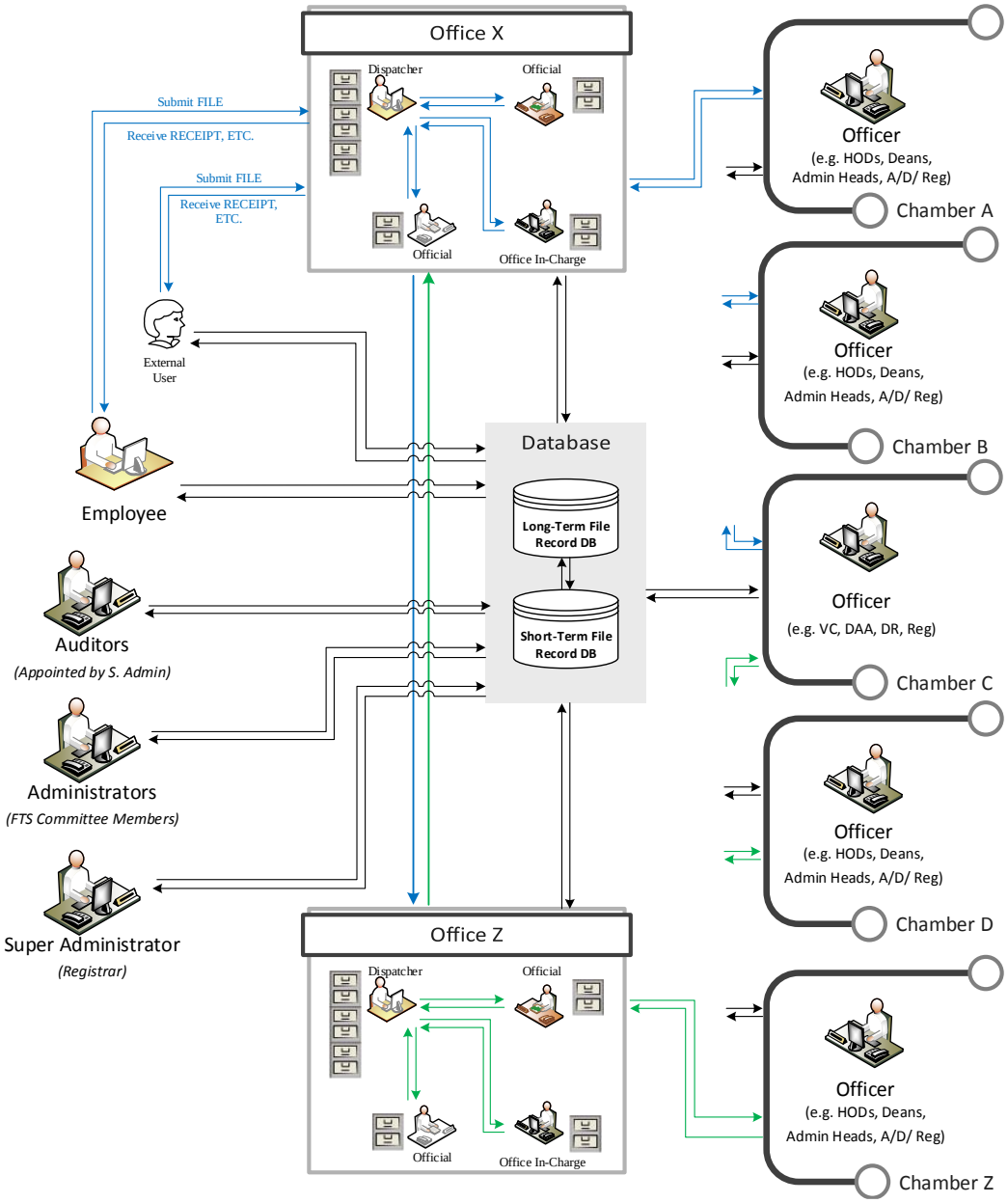


Fig. 2. File movement and file record in the proposed system

In table 4 (given at the end of this paper), list of file record maintenance operations along with users who can perform these operations are listed. File records can be created by office in-charges, dispatchers, or employees who can also modify the same if the file has not already been dispatched. Essentially, files records can be dispatched by dispatchers who can also update dispatch records in case the dispatched file is not yet received. When a file is disposed-off, its record can be updated by dispatchers or office in-charges. Wrong file records entered by employees or dispatchers owing to some mistakes or oversights can be removed by respective office in-charges. Special file record operations can be carried out by administrators.

In table 4 a list of file record views/reports is also given. Dozens of reports about file movement, user roles, user activity operations, etc. will be generated by the system. The reports can be viewed online, printed, or downloadable as pdf/excel files. A user will be able to view these reports; however, records of only those files, which pertain to that user, shall be included in these reports. The file activity reports include following reports about short-term and long-term files: a) View File Record, View File Status, View File Log, Find File, Office File Reports, Employee File Record Reports, Conditional Alerts, File Disposal Reports, File Record Delete Reports, Track Complaints, Pending File Reports, File Dispatched Reports, File Received Reports, Daily Register Reports, Incoming/outgoing File Reports, Peon Book Reports, Monthly/Quarterly/Yearly Register Reports, File in Hand Reports, Activity log (Administrator, in-Charge, Dispatcher, Employee, Office) Reports, Group/Office wise user reports, etc. The system will also be able to generate other criteria based reports.

5. Prototype Design

A model design of the web based file-tracking system was implemented in Microsoft Technologies using ASP.NET with client and server-side programing for web forms, reports and backend processing performed in C#.NET. MS SQL Server was used as a backend database. HTML, CSS and XML, JQuery, and AJAX was used to make the design appealing. In the model design, more than twenty user interaction forms were designed including forms for file creation, file dispatch, and receive. A few reports were also designed to evaluate the report generation functionality of the proposed system. A screenshot of file creation and file dispatch user interaction forms is shown in figures 3 and 4.

The web based file-tracking system was tested on all major operating systems including Windows, Linux, and IOS. Besides this it was also tested on Web enabled Mobile Devices. The model design was tested on all major web browsers including Apple Safari, Internet Explorer, Mozilla FireFox, Flox, Chrome, and Opera. The results of the tests were successful across tested operating systems, and browsers.

6. Implementation Strategy

The proposed file-tracking system may involve a pilot implementation before a phased implementation in all offices of the University of Kashmir. The details are enumerated in table 5 below.

Table 5. Implementation Strategy

Stage	Details
Pilot Implementation	**a) Training:** Training in the use of the web-based file-tracking system shall be provided to one super administrator, one administrator, four office in-charges, eight dispatchers, and ten other University employees.
	b) Implementation: The pilot implementation of the proposed file-tracking system shall be hosted on test servers. The users trained for pilot implementation shall be given access to the file-tracking system. The office in-charge and dispatchers shall be divided in two groups who will perform the tasks as per their roles. The pilot implementation will run in four University offices parallel with the existing system.
	c) Debugging: Any errors found by running the proposed system in its pilot implementation shall be rectified. The system shall be put to another pilot implementation until successful results are achieved.

	a) Training: Training in the use of the web-based file-tracking system shall be provided to administrators, auditors, office in-charges, and dispatchers in a phased manner that will cover all University offices. A manual describing the use of the file tracking system for all types of users including employees and external users shall be made available online.
Phased Implementation	**b) Implementation:** After the successful implementation of the system in the pilot phase, phased implementation of the system can be undertaken to make the system functional in all University offices. At this stage, the system shall be handed over in Toto to the administration and the developers will have no control or roles to play other than debugging and future up-gradations.
	c) Up-gradations: The system can be later upgraded to add new required features and to take the system further into a full-fudged e-governance system.

7. Conclusion and Future Scope

This paper analyzes the existing file flow system in University of Kashmir and proposes the design, development, prototype and implementation strategy of web based file-tracking system which when implemented shall improve the management, tracking, history and auditing of files. It shall all also increase staff efficiency. It shall offer features such as fast searching, scheduling, reminders, and built-in messaging tools. This paper also discusses some of the existing file management and monitoring solutions, their features and shortcomings. In future, the designed file tracking system may be scaled and enhanced in various ways which can lead the University to paperless e-governance system where in digital files will be used instead of traditional paper based files. Email and or SMS notifications can be sent to File Owners notifying them of the status and progress of their files. Mobile apps can be developed to allow officers to view / work on files remotely as well as allow the file owners to monitor the status of their files. Digital signatures can be added to files for the purpose of security and encryption.

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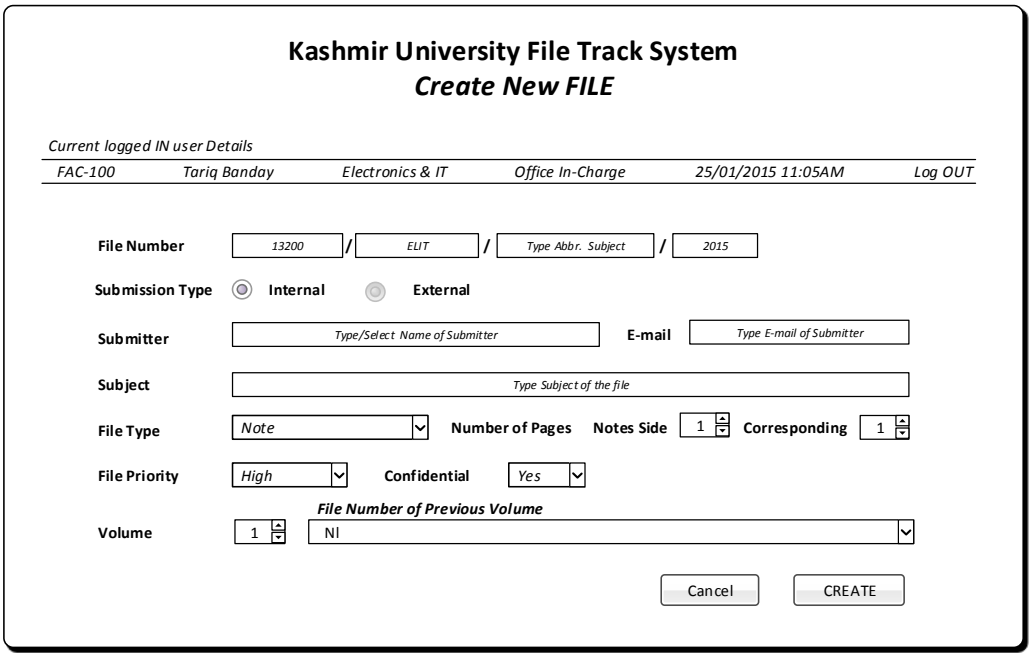

Fig. 3. User interaction form for creation of new file.

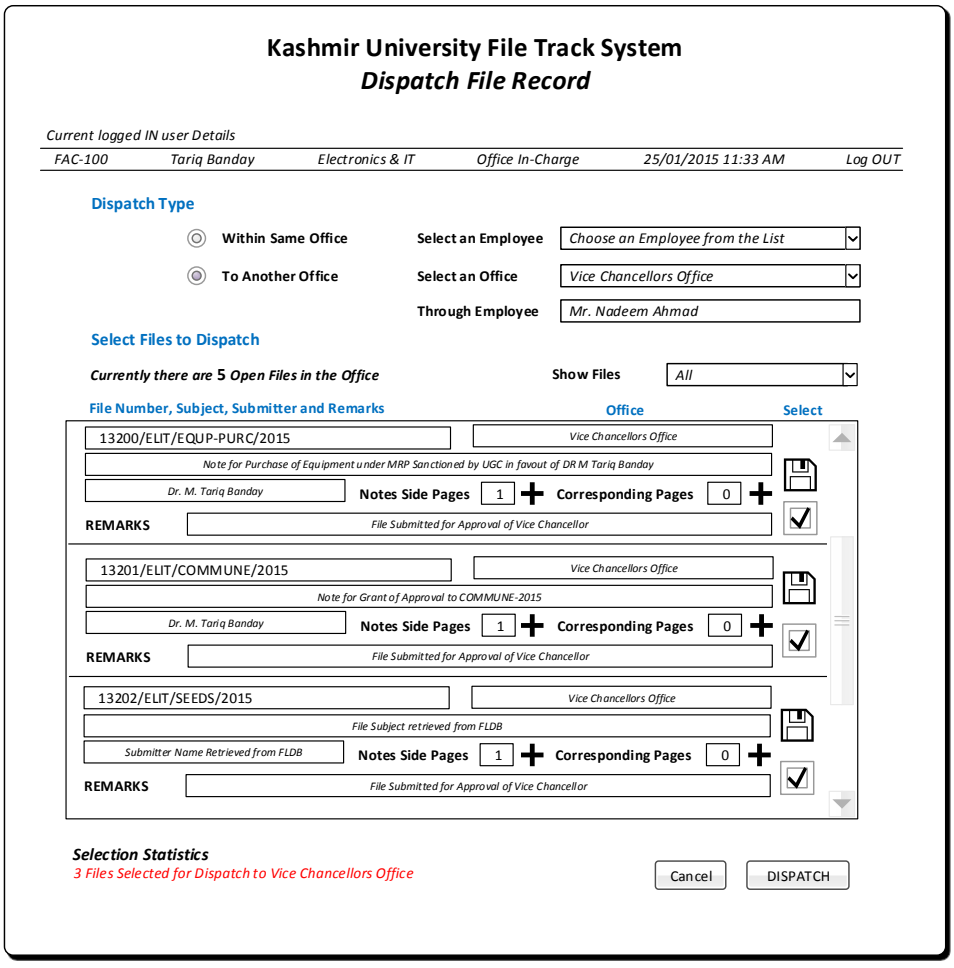

Fig. 4. User interaction form for dispatch of file record.

Table 3. Users and their Roles (User Management)

User Type	***User Profile Management***				***Office & Office File DB Management***							***Administrator & Auditor Management***								***Office In-charge Management***								***Dispatcher & Employee Management***							***EX. User MGM***		
	Create	Login & Change PASS	Forgot PASS E-mail	Other Profile MGM	Import & Export O	Add O Details	Update O Detail	E-mail O Details	Add O File Record	Update O File Record	Import & Export OFR	Create	Import & Export	Set Roles	Reset Password	Send E-mail	Authorize	Block	Other Administration	Create	Import & Export	Set Roles	Reset Password	Send E-mail	Authorize	Block	Other Administration	Create	Import & Export	Reset Password	Send E-mail	Authorize	Block	Other Administration	Reset password	Block	Remove
Super Administrators	☑	☑	☑	☑	✓	✓	✓	✓	✓	✓	✓	☑	☑	☑	☑	☑	☑	☑	☑	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auditors	☑	☑	☑	☑	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Administrators	☑	☑	☑	☑	☑	☑	✓	✓	✓	✓	✓	×	×	×	×	×	×	×	×	☑	☑	☑	☑	☑	☑	☑	☑	✓	✓	✓	✓	✓	✓	✓	☑	☑	☑
Office In-Charges	☑	☑	☑	☑	×	×	☑	☑	☑	☑	☑	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	☑	☑	☑	☑	☑	☑	☑	×	×	×
Office Dispatchers	☑	☑	☑	☑	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Employees	☑	☑	☑	☑	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
External Users	×	☑	☑	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

Note: A ☑ mark indicates an essential operation, ✓ mark indicated an optional operation, and a × mark indicates no access.

Table 4: Users and their Roles (File Record Maintenance and View)

User Type	***File Record Maintenance***									***File Record View and Reports***																											
	Create New File R	Update File R	Dispatch File R	Update Dispatch File R	Receive File R	Dispose Off File R	Delete File R	Special File Operations	Other File Operations	View File Record	View File Status	View File Log	Find File	Office File Reports	Employee File Reports	Criteria Based Reports	Conditional Alerts	File Disposal Report	File Delete Report	Track Complaint	Pending Files Report	Files Dispatched	Files Received	Daily Register	Incoming Files	Outgoing Files	Peon Book	Dispatcher Activity Log	Monthly Register	Files in Hand	Activity Log (Admins)	Activity Log (In-Charge)	Activity Log (Dispatcher)	Activity Log (Employees)	Activity Log (Offices)	Office Files	Group Wise User Reports	Authorized/Blocked Users
Super Administrator	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	☑	✓	✓	✓	✓	✓	☑	☑
Auditors	×	×	×	×	×	×	×	×	×	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Administrators	✓	✓	✓	✓	✓	✓	✓	☑	☑	✓	✓	✓	✓	✓	✓	✓	×	✓	☑	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	☑	✓	✓	✓	✓	☑	☑
Office In-Charges	☑	☑	✓	✓	✓	✓	☑	×	×	☑	☑	☑	☑	☑	×	☑	×	☑	☑	×	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	×	×	☑	☑	☑	☑	☑	☑
Office Dispatchers	☑	☑	☑	☑	☑	☑	×	×	×	☑	☑	☑	☑	☑	×	☑	×	☑	☑	×	☑	☑	☑	☑	☑	☑	☑	✓	☑	☑	×	×	×	×	×	☑	×	×
Employees	☑	☑	×	×	×	×	×	×	×	☑	☑	☑	☑	×	☑	×	×	☑	☑	×	☑	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
External Users	×	×	×	×	×	×	×	×	×	☑	☑	☑	☑	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

Note: A ☑ mark indicates an essential operation, ✓ mark indicated an optional operation, and a × mark indicates no access.