

Information Technology Service Management System

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Abstract — ITSM (Information Technology Service Management System) is a Cloud-Based Web App that is designed to handle the workflow of various IT projects that are undertaken in an organization. The workflow includes the commencement of the idea of the project from the Business Department to the Central Technical Surveillance Department, which monitors the entire workflow, and the IT Department which is responsible for the development of the project. There are various stages from the Initialization of the project, Documentation, and Validation. The Validation stages are further divided into various sub-stages where the idea is presented to each department for assessment and for providing a rough estimation of the cost that would be incurred while working on the project. The members of various Departments may hold meetings to discuss and to infer upon the changes or modifications that are necessary to incorporate in the project. The Web App aims to serve as a platform where the information can be stored, and shared centrally, to ensure a smooth workflow.

Keywords— *Cloud-Based Web App, IT Department, Initialization of the project, Documentation, and Validation, various Departments may hold meetings, centrally.*

1. INTRODUCTION

“The Airline Group” or “TAG” is a consortium owning a group of airlines in Europe. The company has around 50,000 employees across the airline is up. TAG has its own IT division with its branding – “TAG tech”. “TAG tech” handles all the IT operations across the airline group.

TAG tech has 3 major functions:

1. Managing Business-As-Usual (BAU) operations of the various applications running on its infrastructure.
2. Track and fix issues and bugs.
3. Programs / Projects to align with the company’s strategy/vision.

1. Managing Business – As – Usual (BAU) operations. The functioning of business applications that support day-to-day operations is critical to the very existence of the organization. They are also called business-critical applications. The IT infrastructure (servers, networks, support, etc) is the backbone of these applications. This function tools/agents the existing IT infrastructure can support the optimal running of these applications. This function can include application end users, helpdesk support teams, application maintenance teams, monitoring tools/agents.
2. Track and fix issues/bugs: IT systems (hardware/software) need to have an efficient issue tracking and fixing mechanisms to ensure business continuity. This function continually monitors bugs/issues reported by the users or system monitoring tools and tracks them to completion/issue resolution. The organization has employed ample resources to ensure any issues in its business-critical systems are promptly investigated and fixed.
3. Deliver Programs / Projects to align with the companies strategy/vision: Every organization needs to keep up with the changing market conditions and rapid technological advancement. To cater to this, TAG tech has this major function of initiating, managing, and delivering software projects that would keep the organization aligned to its mission statement as well as keep up with the market trends and latest technologies. TAG tech implements the PRINCE2 & Agile project management methodology to manage its portfolio.

The ITSM (Information Technology Service Management) system ensures that it caters to all the needs that are required by “TAG - Tech”.

Table 1: Table of Existing Methodology

Work Cited	Year	Author(s)	Overview
[1]	2019	Hendro Gunawan	The research paper focuses upon why strategic IT planning is required in an IT organization and how a Management system helps to achieve that. The company or organization must consider building and implementing a clear Information Technology Service Management (ITSM) that can control all IT services better. The paper explains to us the various models and the dependent frameworks that are present and will be useful for an ITSM implementation.
[2]	2019	Abdulazeez Ftahi, Abdul Hafeez-Baig, Raj Gururajan	The purpose of this paper is to examine how knowledge application capability effectiveness (KACE) in ITSM can be affected through several knowledge management processes. In ITSM, the IT service desk function deals with various IT problems and incidents daily through the utilization of all available knowledge resources (i.e., organizational knowledge and personal knowledge). A framework was developed to identify factors that affect KACE in IT service desk function. The framework focuses upon socialization, externalization, internalization, and combination as contributors to the formation of KACE.
[3]	2018	Vipul Jain, O.P. Wali, Raveendra Saradhi	This is a literature review that explores the various ITSM that are adopted by various companies worldwide between 2010 - 2018. It finds that not all ITSM practices are uniformly adopted, and some processes tend to be adopted more widely than others.
[4]	2016	Anup Shrestha Aileen Cater-Steel Mark Toleman	Using the Design Science Research methodology, it developed an innovative Software-mediated Process Assessment (SMPA) approach that automates the assessment of ITSM processes and supports the decision-making of IT Service Managers. It implemented a decision support system (DSS) to automate the SMPA approach and evaluated it at two IT service providers.
[5]	2015	Ali Yazici, Alok Mishra, Paul Kontogiorgis	The objectives of the study are to inform the training organizations (e.g., universities, training institutes) on the status of the educational activities in ITSM at undergraduate and graduate levels; and to guide the researchers by providing quantitative data on the research activities conducted in the field.
[6]	2014	Narges Shahsavarani, Shaobo Ji	This paper presents the results based on a study of the comprehensive review of publications in ITSM from 2000 to 2010. The findings suggested five primary conclusions: 1) lack of theoretically driven research; 2) the field is still improving 3) ITSM performance issues, justifications, and IT Infrastructure Library (ITIL) are popular topics of research; 4) ITSM researchers do not seem to consider research at an individual level; 5) the most popular research method was the conceptual orientation.
[7]	2013	J Iden, T. R. Eikebrokk	This article provides a systematic review of existing research related to the implementation of IT Service Management (ITSM) and the Information Technology Infrastructure Library (ITIL).
[8]	2013	Thorsten Proehl, Koray Ere, Felix Limbach, Ruediger Zarnekow	The applied research method is the literature review, in which a search is conducted across 8 major global, regional, and national conferences as well as 71 international journals. To classify the results, a morphological box is used. Moreover, keyword analysis is conducted to obtain an overview of research topics.
[9]	2010	Antti Lahtela, Marko Jantti, Jukka Kaukola Tieto	This paper focuses on the implementation of an ITSM in the IT Infrastructure Library (ITIL) Framework. ITIL is the most widely used IT service management framework. It consists of best practices that can be used in implementing, for example, service support processes, such as incident management and problem management.

II. LITERATURE SURVEY

A. SURVEY OF EXISTING SYSTEM

The existing workflow uses a manual document-based system where each committee that wishes to modify the document has to follow a series of steps which involves manual documentation for every step which is involved in the development of a product, throughout its lifecycle.

Even though the existing system has multiple layers of stages and guidelines the communication through each stage follows a more traditional approach of contacting via emails and for decision-making events, a panel of meetings is called, and then a collective decision is made.

The updates for every iteration of delivering the product are usually communicated via meetings and/or by email and spreadsheets. The estimation of the cost, assigning of Project Manager, Proposal Lead, individual tower head, subject matter experts are done only through the spreadsheet, and for every new revision, a new sheet instance is used as it helps in maintaining time-based data. For every update in cost of expenditure that would include CAPEX, OPEX and a total of both of these will be updated and a new revised instance of the cost sheet will be created (the term cost sheet refers to a record that is maintained digitally and/or traditionally via the concerned authority). The record for FDR (Front Door Request) also creates a chain for updates in all the corresponding documents so that the records are saved, for all these steps the necessary and respective authorities are informed and are requested to update their records as well.

To keep track of all the meetings for every step/iteration/epoch of the development cycle there are specific action trackers maintained by the organization, these trackers are known as:

1. Triage Tracker
2. Solution Sketch Tracker
3. Statement of Work Tracker

Each of these trackers maintains the records for their respective category and are later used for the analysis of the development to gain various insights such as the efficiency of the development, improvement over the previous work, how well the particular team performed, the number of meetings conducted, the performance of every individual team leader i.e. Proposal Lead and Project Managers, and then these factors along with or without others can be used to improve the overall development of future applications. As initially mentioned, TAG is referred to as The Airlines Group which specifies a cluster of companies under the parent's name of TAG improvement of the company as a whole is an important aspect which in turn leads to providing the employees to work along with cross-company, though the process remains same it gives an employee of one child company a chance to understand the work culture, ethics, and environment of other company.

B. LIMITATION EXISTING SYSTEM OR RESEARCH GAP

- The current workflow involves a lot of interaction between stakeholders that happens outside the project process.
- The current workflow is based on excel sheets. This makes data handling, storage, analysis a big overhead for the organization.
- As there is no central system managing this document workflow, email is used to communicate and send documents. This makes the system prone to human errors and unnecessary duplication of data.

III PROPOSED SYSTEM:

A. Details of the hardware and software components

Hardware Requirements:

Table 2: Hardware Configuration

Parameter	Value
Processor (CPU)	Intel Core i7 10875H or AMD Ryzen 7 5800x or higher.
Memory	16 Gigabytes or higher.
Disk Requirements	256Gb of SSD for storing application.

Software Requirements:

- Web Server.
- Browser.
- Operating System that supports web development and deployment.

Technologies Used:

- Python3.7
- MongoDB
- HTML5
- CSS3
- JavaScript ES6
- jQuery
- Bootstrap
- Django 3.0.5

B. Design Details:

Use case diagram represents the user scenario and at its a user's interaction with the system in accordance with its association between the user and the different possibilities in which the user is participating.

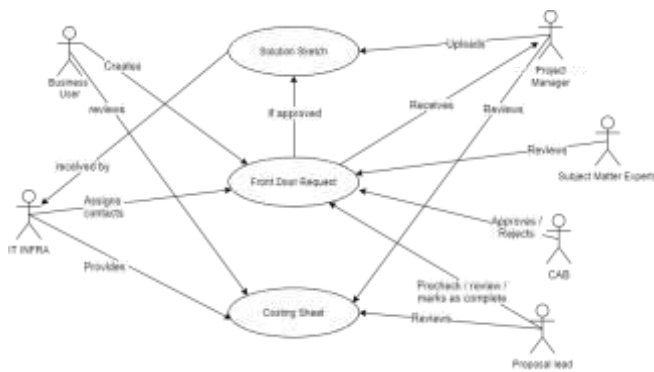


Figure 1: UML Diagram

The proposed system aims to make use of principles of the traditional approach and provide a more simple, central, and automated approach. Thus, reducing various factors such as data redundancy, inefficient communication, and human-based error. For understanding the system, we can divide it into various modules and understand them:

- **Databases:** The database is the most fundamental part of the application as the entire record maintenance will be on the cloud, more precisely a centralized cloud. The database architecture for each operating company is separate with some exceptions where an employee works in more than one organization. There will be a centralized database for FDRs, costing sheets, action trackers corresponding to the respected employees working on it. The database for users will be centralized for reasons such as reducing latency while logging in, this also helps the switching of operating companies and/or domains easily. Now from the above description, one can easily conclude one or both two things:
 - The generated database would be large.
 - And how will you perform analysis.

considering both the points the database technology that will be used is MongoDB or simply non-relational databases, or NoSQL databases, as this stores the data in the form of documents storing and analysis both becomes relatively easy and simple. Along with giving us the benefits we need it easy to scale and relatively easy to work with once the engine is properly configured.

- **The Web Stack:** Since the entire application will be automated one major concern would be to make the system responsive, this provides the flexibility to the user to make the necessary changes on the go from a smartphone, a laptop, tablet, a computer, this improves the overall efficiency of working for an organization, consider an example, if there are 10 FDRs under a single business user, in a traditional system you have to browse thrice the number of revisions to go through them and check the status of the development, when it was last updated, what is the current status of the same and if the latest update is missing the user will have to contact the

proposal lead of each projects to know their status, but our system makes all of these as simple as browsing to the dashboard and then selecting the required FDR and all the details are visible, at the same time if the business user wishes to add the comment he/she does not needs to contact the respected authority, all he/she has to do is just add a comment for that.

So now the question arises is it possible to scale the entire application to be able to work with the entire group of companies individually while being centralized at its core, and how well can the team deal with the latency issues. Answering them, yes, it is true to scale the entire application using the right tools for it, and in our case, we are using the Django framework which is built for large scale applications such as ours and is secure because of its strictness, as for being centralized the concept of subdomains, splitting of the databases (as in our case) can be used. Now coming towards latency issues the technique to deal with it is on both the hardware and software front, the application should be optimized to use the process, necessary fields, while using caching for storing less secure details on the user's system such as the styling and UI components, as for the hardware front a decently configured server along with the 10-bit gigabit ethernet for data transfer, the latency issues would be resolved.

- **The Workflow on the ITSM:** The workflow will be completely automated, and the approach will remain the same as that of the traditional system that is being followed, so the users will have less to no effort getting accustomed to the application. The application will work in the following ways:
 - Every user will have a dedicated dashboard for them with the normal permissions and rights that a user gets with his/her designation.
 - E.g.:
 - The business user will have the option to create the FDR and monitor it
 - The proposal lead will have the option to update the FDR, corresponding costing sheet, action trackers along with the option for updating the details of the mentioned documents if needed.
 - The project manager will have the ability to view and update the FDRs, and the Triage Action Tracker in the read-only mode.
 - Each SME will have the option to update the costing sheet, FDRs as necessary for their respective towers.

- The costing sheets, FDRs being centralized can be viewed and updated by only the necessary user and then forwarded for further actions, and then the further actions can be taken on the same object (document) thus reducing the redundancy of the documentation. While at the same time the timestamp of each of these actions being recorded for future analysis.
- The application will provide a simple drop-down for the users who belong to multiple companies for them to switch between the organizations with no effort.
- The status update of the FDR fields and the individual status will be automatically updated by the application thus removing the possibility of the human error of closing a particular FDR later than its actual date. And these actions will be recorded as well. Each FDR will have the option to upload the images, pdfs, docs for the solution sketch and statement of work.
- Coming to the communication between the users, it will be accomplished by either/both medium of commenting on the documents and by using an inbuilt mailing service.
- The application will have an inbuilt analysis and reporting service thus removing or reducing the need to depend on external tools while giving the ability to perform organization-specific analysis with ease and at the same time being available within a common application.
- There will be a superuser or admin who will be granted the ability to create the users, as the application is organization-specific signing up can only be provided to the user by the superuser or admin.
- Security: Coming from all the above-mentioned points it is an obvious question how secure the application is. And to answer that question few things are required to be implemented (or will be implemented if absent), those are a good firewall, SSL integration, and a secure hosting platform. Other than these the application provides domain-specific logins, load balancing for simultaneous logins, access only to the necessary ports, communication within the application to avoid any data leak/breach that can happen, records of every email sent or received to trace the origin of the issue if any happens, etc. depending upon the requirements.

CONCLUSION

We summarized the entire workflow of the functioning of the application and started implementing modules required throughout the application such as the account for logging into the system, the dashboard for displaying tables that are fetched from the database, and action trackers for tracking of progress during projects registered into the application. We have implemented the tasks of assigning the Project Manager and Proposal Lead for the FDR received for a particular project. The Action Tracker, Solution Sketch, and Statement of Work are also built where meeting notes, FDR creation date, and FDR received dates are stored.

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