Adaptive Workflow Tracker

A context-aware and workflow-based framework for pervasive environments

Susan Joseph [1], Deepika R [2]
[1, 2] Department of Computer Science SRM Institute of Science and Technology, Chennai, India

Abstract – In this paper, we make use of the priority scheduling algorithm and the central theme and ideology of the First Come First Serve Algorithm. Every job is associated with a release time, deadline required computation time and required energy from every member of an organization. The algorithm relies on the notions of energy demand and slack energy for a member and this is different from the well-known notions of processor demand and slack time. Each job can be performed periodically or with a defined deadline. The reason for the proposal of the solution is to take into consideration each employees working capabilities and work patterns (regular, periodic or sporadic bursts of energy spikes). This ensures better workflow tracking of each individual in a system hence improving the overall productivity. The productivity of every individual can be tracked and quantified which can be directly translated by the employer in terms of effort hours, standard labor hours, labor productivity and standard efficiency. This model is specifically aimed at connected office spaces where the employee's presence is mandatory to access his/her login.

Index Terms – Task scheduling, performance tracker, progress monitors, adaptive task management.

1. INTRODUCTION

A workflow tracker is a systematic and diagraphic structure of predefined activities, upon completion produce the desired result. The concept of a workflow tracker is to enable higher productivity, greater visibility, and simple and efficient project and workspace tracking. This will enhance productivity rates of every employee. In the long run, this also improves retention rates among employees in every workspace. Workflow technology is an effective means of modeling and management of two major components: complex interacting business processes and employees.

A traditional definition of a workflow can be observed as - "automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules"[1][2]. Although the workflow technology is already quite mature and commercial workflow management products are readily available, it has been observed that the technology lacks methods of personalization or an effective method of prioritization of tasks within the workspace. The smart workflows are those that operate as per context information gathered from environment or domain knowledge. Each job is characterized by an energy and effort component which is the amount of energy/ or the random energy spikes displayed by that employee.[7]

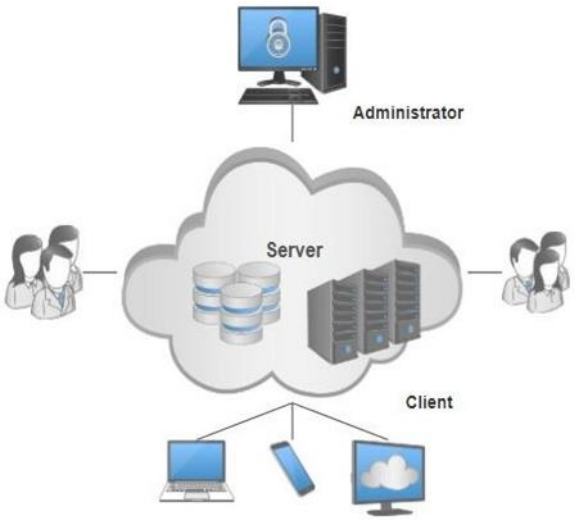

Fig 1.1

This is needed for the execution of the takes. We assume that the energy requirement of a job does not necessarily have to be proportional to its execution time [7] due to each employer's individuality and work comfort. In order to make workflow management context-aware and more personalized as per employee's working patterns, extensions and modifications are required in existing architectures and standards of workflow management systems. This paper describes a framework [Fig 1.1] for designing and managing workflows that encompass different aspects and patterns of context change. To implement the personalization and efficiency we will be utilizing the concepts on the Priority Scheduling Algorithm and First Come First Serve Algorithms.

2. RELATED WORK

Current systems focus on scheduling and optimization of hardware components, for eg: Processors scheduling, energy harvesting etc. [5][6] These systems or concepts focus on practical considerations now, unlike previous theoretical approaches. This paper implements the same concepts on a real-time, day to day application of the same concepts.

Lately, several techniques based on evolutionary search and filter algorithms have been proposed to automatically optimize

task scheduling processes in traditional progress monitors. In this paper, we apply the same concepts in the domain of work-flow progress monitoring systems. This system solely depends on cloud data backup, which makes enhances accessibility compared to existing models of scheduled progress trackers.

Further, our system provides the conceptual framework that studies the task completion patterns and provides options for modification accordingly, enhancing the user experience for all users.

3. PROPOSED MODELLING

The central motif of the tracker is to manage and automate the workflow progress. This tracker is a derivative of a basic BPO system. (Business Process Outsourcing), along with enhanced adaptability and personalization as per user being tracked.

Companies can use this software to automate business processes depending on their needs.

Linking their domain to the tracker will reduce hassle and ensure that a single platform can fulfill all/maximum purposes.

It will be a cloud-based and mobile application driven solution.

Users:

Backend - Administrator

Front-end - Employer - to track employees

Front-end - Employees - to update their current work status.

We have developed an algorithm-based task assignment technique that uses two key scheduling algorithms as their primary formulae.

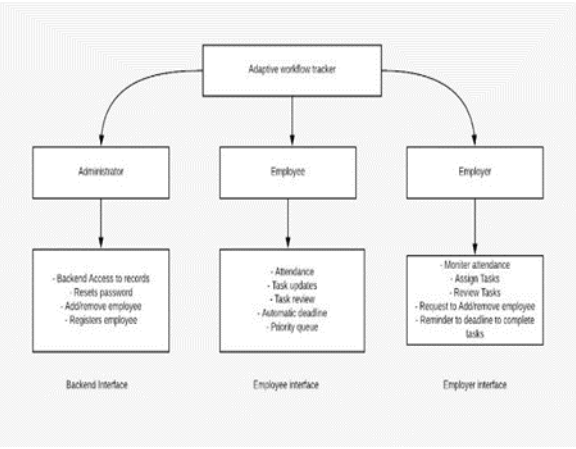

Fig 3.1
This figure maps the login flow diagram of every user.

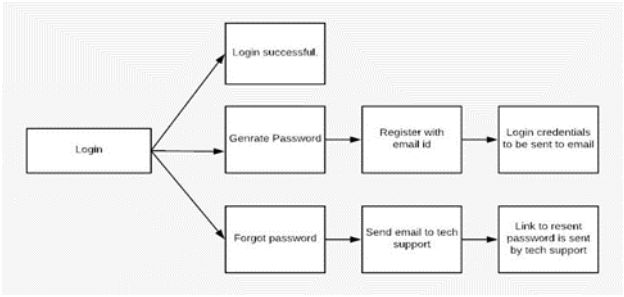

Fig 3.2

The first layer that the users encounter is the login page. Every user has a different login option, i.e. admin login, employee login, employer login. Each new employee has to register for a new account which is approved by the employer. And each new employer account is approved by the admin user.

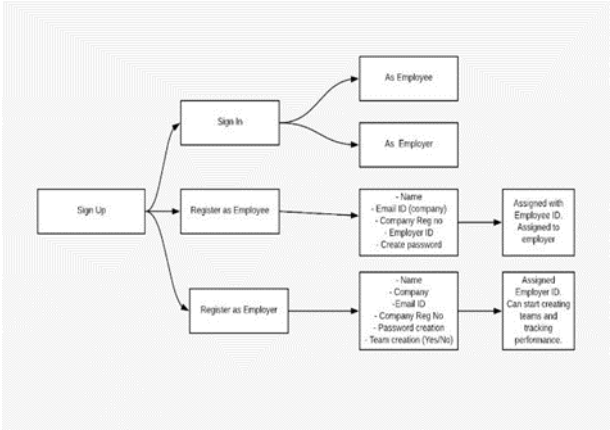

Fig 3.3

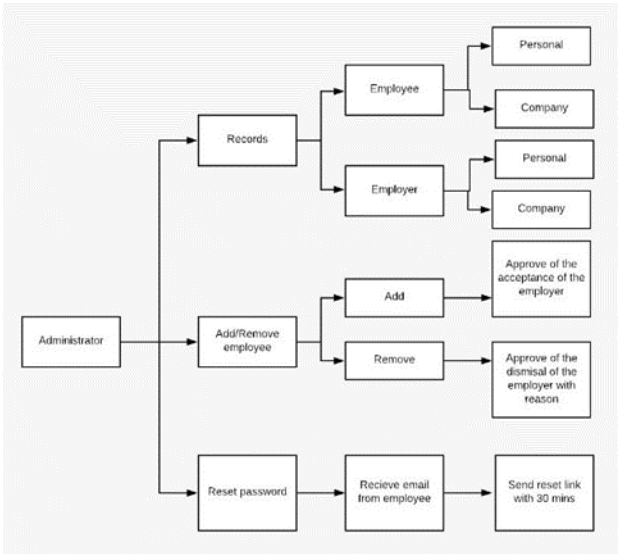

fig 3.4

The entire framework is divided into three modules, Administrator, Employer and Employee. Each of the following have various other components within them, based on each user's requirement.

This figure [Fig 3.4] talks about the detailed logged in experience of an employee, which includes access to their attendance, daily tasks, daily task progress for on-going processes, task review, for retrieving old information etc.

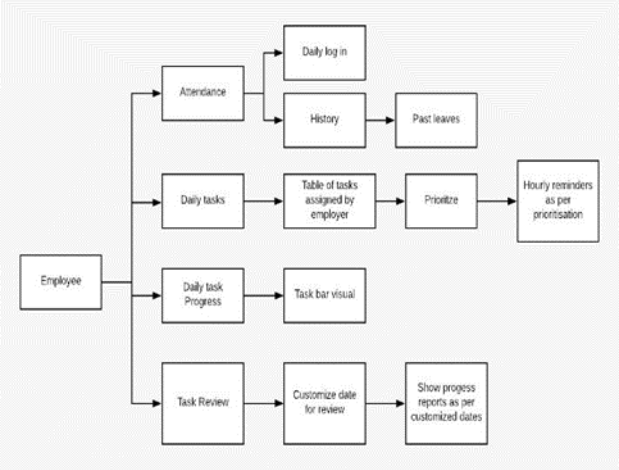

Fig 3.5

This diagram describes the detailed login experience of the Administrator, including entry and access of new records, adding or removing employee accounts and resetting password etc.

4. CONCLUSION AND FUTURE SCOPE

In this paper, we haven't fully been able to implement the solution to its extent and have presented a conceptual framework with multiple illustrations. It may be easily adopted in a wide range of applications. We have developed a workflow model that supports workflow modeling as suggested in the framework but further work on improving worker efficiency and productivity as per use of ontologies is needed to be addressed. We would also like to test this framework on various other new or existing case studies.

REFERENCES

[1] A Conceptual Framework for Smart Workflow Management Abu Zafar Abbasi, Zubair A. Shaikh , International Conference on Information Management and Engineering 2009
[2] Wireless Scheduling with Deadline and Power Constraints- Yiqiu Liu, Xin Liu, Lei Ying, and R. Srikant [52nd Annual Conference on Information Sciences and Systems (CISS)] 2018
[3] An Empirical Study of Search-Based Task Scheduling in Global Software Development- Josiane Kroll Shai Friboim Hadi Hemmati [IEEE/ACM 39th International Conference on Software Engineering: Software Engineering in Practice Track] 2017
[4] Adaptive Hybrid Clone Genetic Algorithm based Optimal Node Scheduling for Maximizing the Network Lifetime in Large-Scale Wireless Sensor Networks, Jie Zhou, Min Tian 9th International Conference on Intelligent Human-Machine Systems and Cybernetics. 2017.
[5] near-Optimal Sensor Scheduling for Batch State Estimation: Complexity, Algorithms, and Limits Vasileios zoumas1, Ali Jadbabaie2, George J. Pappas1, 2016 IEEE 55th Conference on Decision and Control (CDC), December 12-14, 2016
[6] Real-Time Scheduling of PI Control Tasks, Sven Reimann, Wei Wu, and Steven Liu IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY, VOL. 24, NO. 3, MAY 2016
[7] Optimal Scheduling for Real-Time Jobs in Energy Harvesting Computing Systems Maryline Chetto IEEE Transactions on Emerging Topics in Computing, Institute of Electrical and Electronics Engineers,2014
[8] A Workflow Service Scenario Based on uWDL for Smart Agriculture, Yongyun Cho, Changsun Shin, DongGook Park, SungEon Cho, Kyoungryong Cho, JangWoo Park, Hyun Yoe Embedded and Multimedia Computing (EMC) 2010 5th International Conference 11-13 Aug. 2010