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Renosystem: Multifamily Unit Renovation Management

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Abstract - Renovating architecture includes repairing, painting, flooring, ceiling, electrical wiring, plumbing and many more. There are many contactors, group of employees and individual worker working on a particular unit, different units have different task. These units depend on each other, like painting should be done after plumbing and repairing. There are many such dependent tasks which should be completed within specific time as the project should be completed before a specific deadline or the firm will have to pay penalty clause that imposes a payment per day if the firms do not complete their activities or the project on time. If one unit causes delay in completing their task it will affect the whole project completion. If there is a proper interaction between every unit in the firm then these penalties can be avoided and project can be completed on or before time. This system communicates with everyone. Contractor knows about new added unit, the material suppliers knows when to order product and when to deliver it, the subcontractors knows when to do their work. There are daily reports and schedule. This keeps everyone on the same page and knowing what they need to do and when.

Keywords: *Renovation system, Scheduling, End User License Agreement (EULA), Google API, Communication gap, UnitRooms.*

1. Introduction

In today's date while purchasing new home many factors are considered like: location, finance, size of apartment, built up area, premium, amenities, reputation of builder, furniture etc. So purchasing new apartment can be a lot of work and investments. Instead of new purchase people prefer renovating their existing place. This saves a lot of time and money.

1.1 Background

Renovation is remaking of broken, damaged, or outdated structure. Renovating brings back life of the structure. It includes process like: planning, rebuilding, structural repair, stable source of income to the builders. Interior designing, furniture, painting, flooring, ceiling, repairing etc. Are the different units of renovation. It takes less and engineering. Renovation gives new appearance and also time and cost to complete renovation of structure compared to new purchase.

1.2 Motivation

While renovating a structure there happens to be delay in completion of work for which the firm has to pay penalties. This delay is due to delay in completion of one task which is been carry forward by other units also and there is a balm game throughout. This happens because of communication gap between employees.

1.3 The problem

While renovating any architecture time delay is the most common problem. The reasons could be lack of communication and no interaction between different working parties. People don't know how much task is completed by different parties. This leads to the blame game where the employee blames the other one for not completing the task. On average, the delay is roughly for 2 day per tasks even if one unit caused delay of 1 or 2 days the other units will be delayed accordingly and again if another unit makes delay this will affect the whole completion of the project by 4 to 5 days. The deadline to complete the project will have to be extended and this affects the reputation of the firm. If firms suffer delays (in meeting the project or interim deadlines) for which they are responsible. A penalty clause that imposes a payment per day if the firms do not complete their activities or the project on time. There should be interaction between the individual units to keep track of each other's work to start the work on time. And each individual should be assigned to a particular task every day and the completed task should be recorded on daily basis. More projects should be managed in less time, there should be live communications with Owners, Management Companies, Contractors, Subs, Suppliers, etc. project should be managed in Real-Time with everyone connected. Using this system, we can keep track onsite work and the communication gap can be bridged. It will keep everyone on task and on same page. It communicates with all parties daily to provide an

efficient project work. Every job is different in many ways and have different working environment that comes with Unit Renovations.

2. Existing Software Tools and Applications Study

As per our study, we studied few of the renowned existing software tools such as Primavera, Microsoft, asana, Jira, Wrike. According to that in Primavera which is product of oracle, it performs planning, scheduling and used for complex projects. It uses network for tracking the progress of project which may cause vulnerability as every user input incorrect information and create conflicts. Microsoft project is a software product developed by Microsoft. Any type of project can be handled by Microsoft project. It assists project manager in planning, assigns resources to tasks and tracks the status of project and it also helps in managing budgets and analysing workloads. This software is a desktop application which runs even without internet connectivity, as it is offline application the data is stored locally which is risk. To use this software the project manager has to learn how to use it which needs some training and experience. The drawback of this system is it does not offer collaboration platform. ProjectLibre is a open source alternative to Microsoft project. It is compatible with Microsoft Project and can be used on Linux, Mac OS or Windows. The project information and progress is visualized through Histograms. The features of ProjectLibre provide features such as producing Gantt, Task and Resource usage. Trello is a flexible application which is used for task management which also gives visual information about person working on it.

The project is tracked with help of system uses cards, lists and cards. users can upload images, give deadlines to cards and add checklists. The drawback of the system is, you need to create process suitable of working for you. without preplanning one cannot use it. Trello works for limited number of tasks. Asana is a SaaS developed project management and team collaborations. It helps team to manage tasks. In this team create projects and specify deadlines, assign the work and communication among team members. In this at only one project at a time is monitored or tracked and after completion we can jump to next project. The projects which are process oriented are suffered. The tasks can only be assigned to one member of a team. Click-up is another cloud-based collaboration and project management tool like Jira software tool. It also includes features such as communication, task assignments and task toolbar. Dashboards are used for viewing projects the disadvantage of system is it just give details about parent process and not the sub tasks. After evaluation of these tools and applications and many others existing projects, we found that every project has some advantages and disadvantages. Our system covers that weakness such as Automated smart scheduling, managing small to large types of Multiple projects, automated communications which are very Essential for keeping transparency, automated task Assignments, user friendly system, user boards for visualization, Cloning templates which saves time for planning next projects, Flexibility and collaborations and much more.

3. Literature Survey

3.1 "A Fuzzy Fault Tree Framework of Construction Dispute Negotiation Failure."

Author : Tak Wing Yiu, Sai On Cheung, and Cho Lei Lok.

This paper is about fuzzy fault tree approach which is used to find out the root causes of construction dispute negotiation failure. Negation failure assessment is explained in this paper. Causes of defined are inadequate preparation, behaviour and contract governance.
This paper focuses on root cause of failing negotiation. According to the author root cause is fundamental cause of undesirable condition or problem which when corrected can prevent it from occurring.
Negotiation failure: gap between what is actually accomplished and what could have been accomplished.
There 3 root causes:

1. inadequate preparation.
2. Inappropriate Behaviour.
3. Contract Governance.

Effects:

1. Inevitable and negative affect project efficiency.
2. Loss in opportunity costs.
3. Loss of commercial clients, revenue, profits and goodwill.

3.2 "Schedule Management Application: Automatic Schedule Generation Using Network Flow Algorithm."

Authors : WaritMekareeya, GanyanatSatiti-thanawisit, NathataiSuansilpponge, ChatsureeSiripolsomsuk, PisitPraiwattana.

This paper is about creating and managing automatic schedules for school, university and organization. It will automatically assign time slot and generate class schedule. It will match resources like people, time and place. Scheduling using Microsoft excel is more time consuming. And when it comes to changes in time of events it

becomes more difficult in rescheduling due to conflict in events.

To generate schedule:

1. Query and aggregate the data that the user has already set.
- The data will be converted into XML format.
- The XML file serves as input of scheduling algorithm.

2. The scheduling algorithm.
- Uses Ford-Fulkerson algorithm as core algorithm.
- Layout is set.
- algorithm tries to push flow from source to sink.

Limitations:

1. I consumes a lot of time.
2. Complex process.
3. Difficult to reschedule.

3.3 "Custom Scheduling Algorithm in Real World Application."

Author : Andrzej Bozek.

Preactor Express software is used as visualization and implementation platform for custom scheduling algorithm. This software is free of cost. It provides many ways of accessing scheduling data like Gantt chart, resource calendars, a report generator. The rules of connecting external algorithm to preactor is presented. A graphical user interface is part of scheduling system. Information presented by GUI can be:

1. Static data: plant layout, resource calendar, routing tables.
2. Dynamic data: represents a current schedule like a Gantt chart.

The scheduling data structure is based in order, product, resource, and resource group. The interface contains panels like data transfer, data maintenance, configuration, schedule and more. The scheduling data can be transferred using excel sheets or database.Database is the central part of dataflow mechanism in the application. Data is accessed in many ways and import from excel sheets. Custom scheduling algorithm will directly be connected to the database. External application reads data and executes the algorithm. Once the data is loaded no verification or rescheduling process.

3.4 "A real-time workflow tracking system for a manufacturing environment."

Author : N.S. Ong.

This paper describes workflow tracking system which collects data automatically in a clustered form and process real time data. It will also verify and validate parts and complete data. Its aim is to enable quality product to be shipped out on timely basis to meet customers' orders.

This paper shows improved assembly and tracking and process flow which include several distinct phases of manufacturing:

1. Daily production schedule loading and WIP generation.
2. .Assembly operation.
3. Test operation.
4. Test operation.
5. Packing operation.

Workflow improvements can be that in system assembly area and accessories kit placement stage, verification against model number can be implemented. It will track product in every stage using integrated database. A serial number will be generated which can be used for identification of the product. And at every stage the database is updated.

3.5 "Digital calendars for flexible organizational routines."

Author : Demosthenes Akoumianakis and George Ktistakis.

This paper is about Online calendar services (OCS) supports multiple views like day, month, week, agenda, etc. and also custom notifications and alarms through email or SMS. These are used by automated scheduling mechanisms among users that share calendar and event invitation via email to guests. It can be deployed in vacation planning and collective information management. It relies on some factors like tracking and archiving resources, indexing, categorizing, recalling data. This paper focus on digital artefacts including web standards (Representation State Transfer-REST protocol), information systems(portals), digital services (file sharing), bundles of code (algorithms, application programming interfaces).

OCS supports multiple views, i.e. day, week, month, agenda, etc. and also custom notifications and alarms via email or SMS services. This paper has advanced a scaffold and a design approach for re-configuring a variety of digital materials, including Google calendar, file sharing, YouTube, etc. it transforms Google calendar from personal or group scheduling artefact to digital ecology of allied services tuned to operate interdependently. It makes provisions for creating domain-specific codes, indexing and bookmarking distributed resources by task, event or multiple coding schemes.

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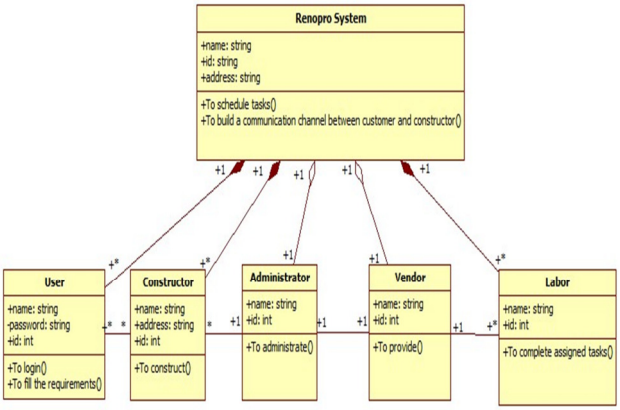
4. Proposed Idea

A renovation system to auto schedule everyday tasks. The



scheduling considers UnitRoom number, UnitRoom name, UnitRoom type, start date, completion date, etc. There will be option for rescheduling also. More units can be added as per requirement A single dashboard will keep track of all the different projects and their activities.

There will be 2 types of users:

1. Site Level Users
2. Client Levels.

Site Level Users are Site owner and Site admin they will have specific rights they have control over all types of users where as Client Levels will include users from client, contractor, supplier, vendor, and viewer. There will be End User License Agreement (EULA) which every type of user has to agree when they first sign in and only owner can update it.

Fig 1. Class diagram of renovation system

The project status visible in 2 states:

1. Active.
2. Completed.

Task duration can be of half day, one day and two days.
Every individual employee will be assigned individual tasks everyday through emails or internal messages.
The communication gap among the different units is reduced and time to time tasks will be completed this will lead to on time completion of project.

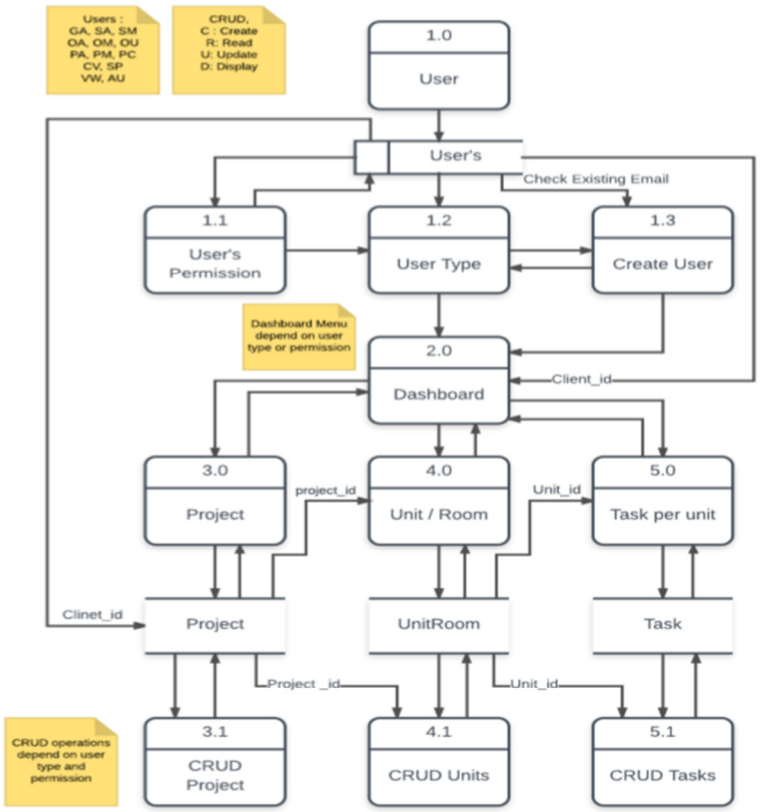


Fig 2. The data flow diagram of renovation system

TABLE -1: COMPARISON TABEL

Parameters	Microsoft Project	Wrike	Jira	Asana	Trello	Click-Up
Pricing	yes	yes	yes	yes	yes	yes
API	no	yes	yes	yes	yes	yes
Activity Management	yes	yes	no	no	yes	no
Automatic Notifications	no	no	yes	yes	yes	yes
Dashboard	no	yes	no	yes	no	no
Document Management	no	yes	no	yes	no	yes
Email	no	no	no	yes	yes	no
Monitoring	no	yes	yes	yes	yes	no
Progress Tracking	no	no	yes	yes	no	yes
Project Planning	yes	yes	no	yes	no	no
Project Tracking	yes	yes	no	yes	yes	yes
Real Time Data	no	yes	no	no	yes	no
Task Management	yes	yes	no	yes	yes	yes
Template Management	yes	yes	no	yes	no	yes
Multiple Projects	yes	yes	no	no	yes	no
Task Scheduling	no	yes	no	yes	yes	yes
Automatic Scheduling	yes	yes	no	no	no	no

5. Conclusions

Renovation is very common these days but to complete the project before specified deadline challenging. This is because of less interaction among different units of the renovation firm. Due to delay in completion of project the firm have to pay penalties. This can be overcome we can design a system which will show all the ongoing activities on a single dashboard which will do automatic scheduling and will reduce communication gap among different units and there will be no blame game among them, each employee will be assigned daily tasks and the report will be generated and this way everyone will be on the same page.

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