

# **Construction Management System**

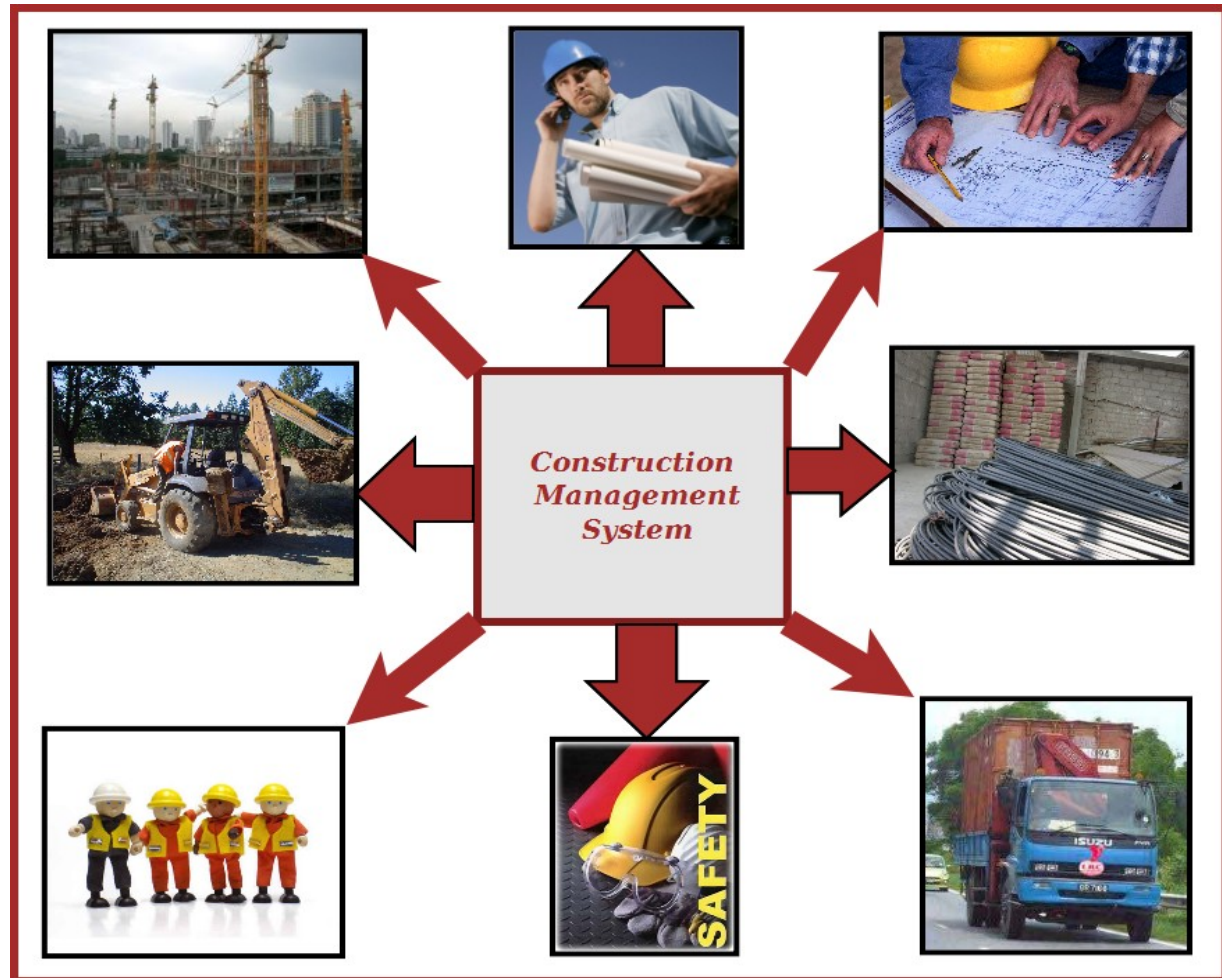
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## Introduction & Objective of the Project:

Construction Management System is software for managing and maintaining a construction site. A construction site has lots of activity going on parallel. Construction management software will enable the site manager to monitor workers, materials used, work progress, planning & estimation of future work.

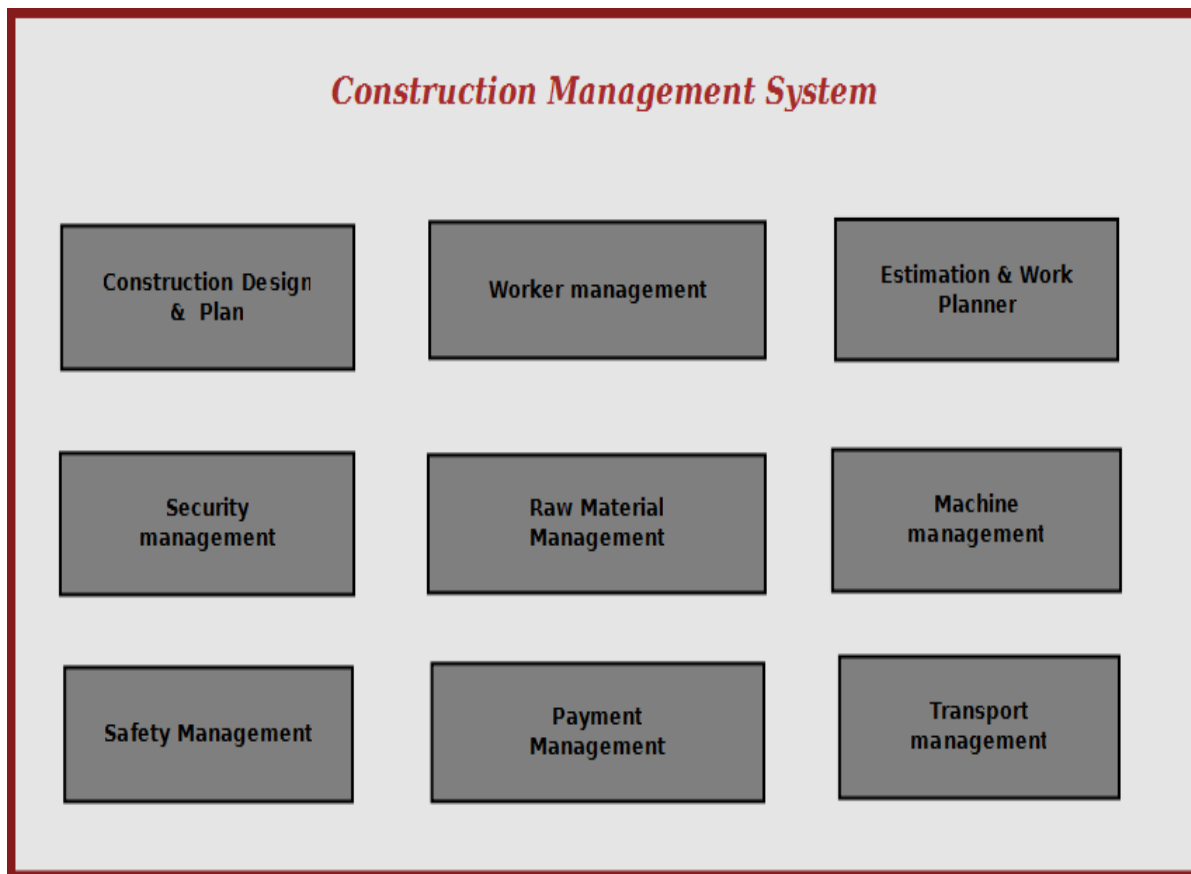


**Figure:** Overview of Construction Management System

The main features of this software are given below:

- Construction design and planning using external designer software
- Design viewer and add comments.
- Worker attendance management.
- Worker Identity info saving and security management

- Raw material stock & pricing information query.
- Estimation & planning of future work.
- Monthly / daily progress report
- Supply management & payment tracking.
- Safety assurance
- Transport management
- Legal work management



**Figure:** Overview of Construction Management System

Construction management system will enable the site manager to control all aspects of construction from a standalone solution. It allows to manage, search and refer important data used in construction, It makes site managers life easy to operate construction activities flawlessly.

## **Project Category:**

This software will follow Object Oriented Programming Paradigm and use below mentioned areas.

**Front End/ GUI Tools:** Visual Studio 2010, .NET 4, C#

**Backend:** MySQL

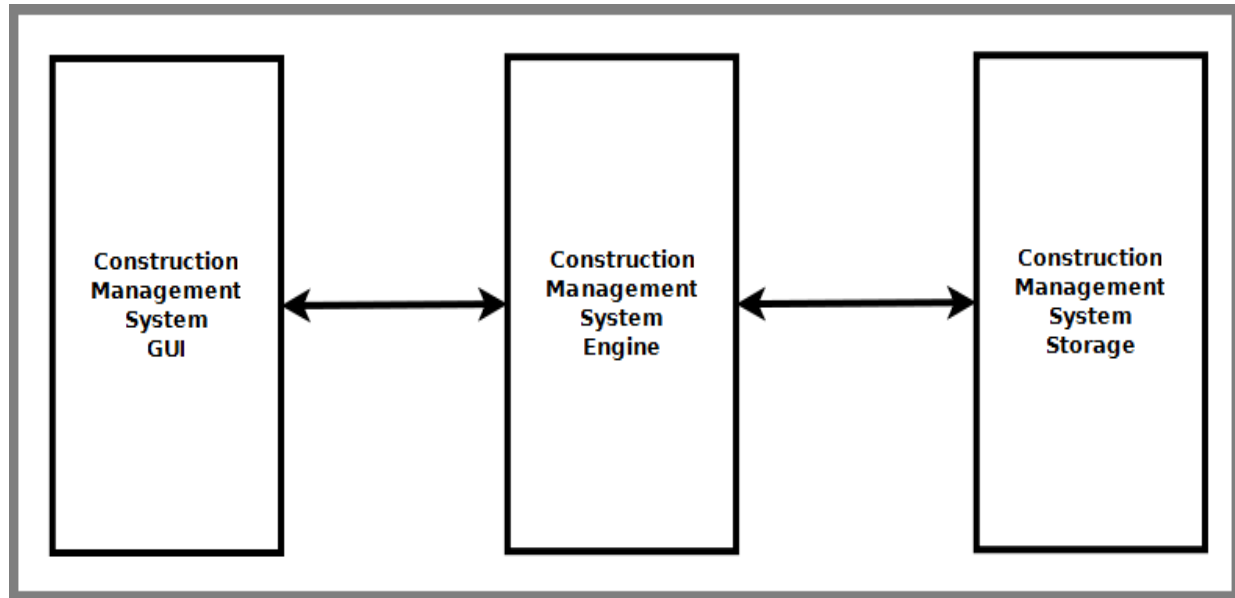
**Networking Technologies:** TCP/IP

**Wireless Technologies:** Bluetooth

**Operating Systems:** Windows XP, Windows 7

## Analysis of the Project:

Construction Management System will provide a cost effective & efficient software solution for managing everything about Construction . Different components of Construction Management System are depicted below.



**Figure:** Components of Construction Management System

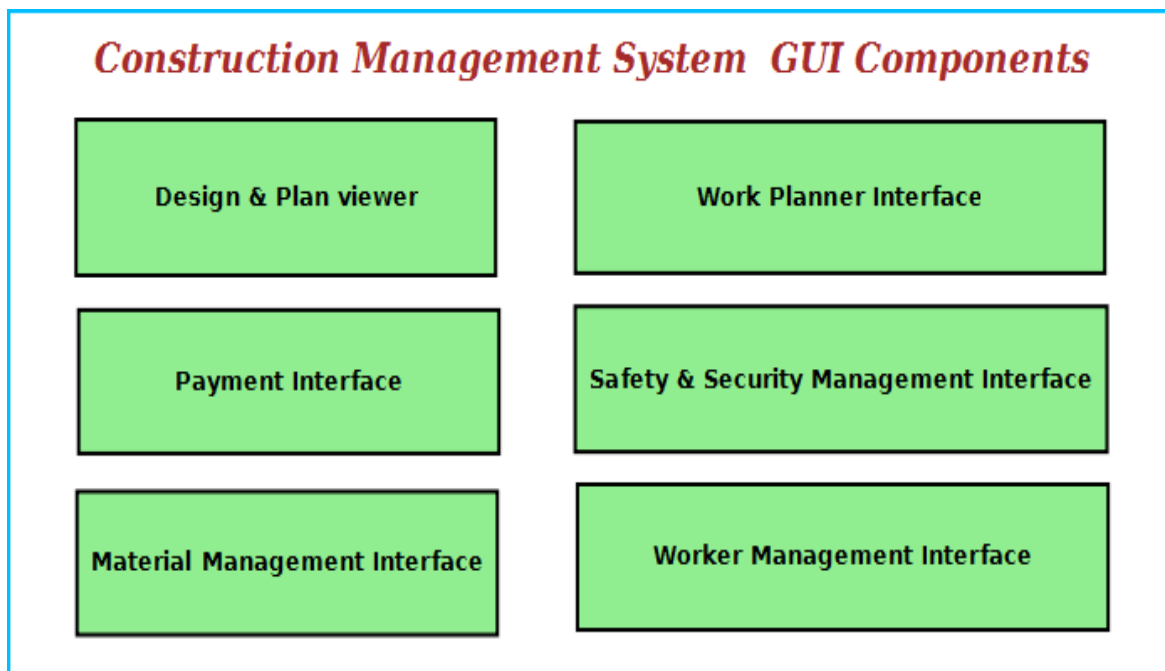
Construction Management System is divided into three main components. Such as:

- Construction Management System GUI
- Construction Management System Engine
- Construction Management System Database

### ***Construction Management System GUI***

Construction Management System GUI will allow users to view existing construction data, enter new data & modify existing data. It will have a user friendly interface so that user can use the software efficiently. It is divided into six modules. Such as:

- Design & Plan viewer
- Work Planner Interface
- Payment Interface
- Material Management Interface
- Worker Management Interface
- Safety & Security Management Interface



**Figure: Construction Management System GUI Components**

### **Design & Plan Viewer**

It will allow to view design & planning file using some external editors & viewer. It will also allow scanning existing plan and view it as a image file. Users can add comments for modification and also generate reports.

### **Work Planner Interface**

This interface will allow user to plan and estimate future work. It will have link to worker management interface so that workers can be assigned certain work. It will also enable to add costing and budget data for the work. It will have a option to add legal data associated with a work item and instruction to be followed.

### **Material Management Interface**

This interface will allow user to manage the material used for construction.

- to search any kind of material of the Construction and view price information and stock details.
- Enter & modify material availability and usage data.

### **Payment Interface**

This interface will allow users to enter payment data associated with various aspects construction work.

- Workers payment
- Raw materials purchase information
- Future budgets
- Infrastructure payments.
- Loan information
- cash flow and cheque information
- bank information

### **Worker Management Interface**

This module will maintain information about workers.

- Construction sites need to maintain the worker personal data, professional experience info.
- This will allow to track workers attendance and work hours data.
- This interface will allow managing security measures to taken about the workers. It will have a interface for entering the worker's security data, photo and scan the photo identity card of the worker.

### **Safety &Security Management Interface**

This interface will ensure safety & security of the construction site.

- Video Surveillance Interface: This interface will display the video of specific areas of the Construction and save the video for future reference. The site manager can monitor from video surveillance window.
- First Aid browser : This display the location first aid boxes and instructions on what to do in case of emergency.
- Emergency contact interface: This will allow user to call ambulance driver, doctor & hospital in case of emergency.



### ***Construction Management System Engine***

Construction Management System Engine controls the overall system. It provides logical and tactical solutions for managing the whole system. The Construction Management System is divided into 12 divided modular components. Such as:

- Engine controller
- GUI Interactor
- Database Controller
- Plan & Design Controller
- Worker Controller
- Work Estimation Handler
- Raw Material Controller
- Machine & Transport Controller
- Payment Handler
- Search Engine
- Safety Controller
- Security Controller

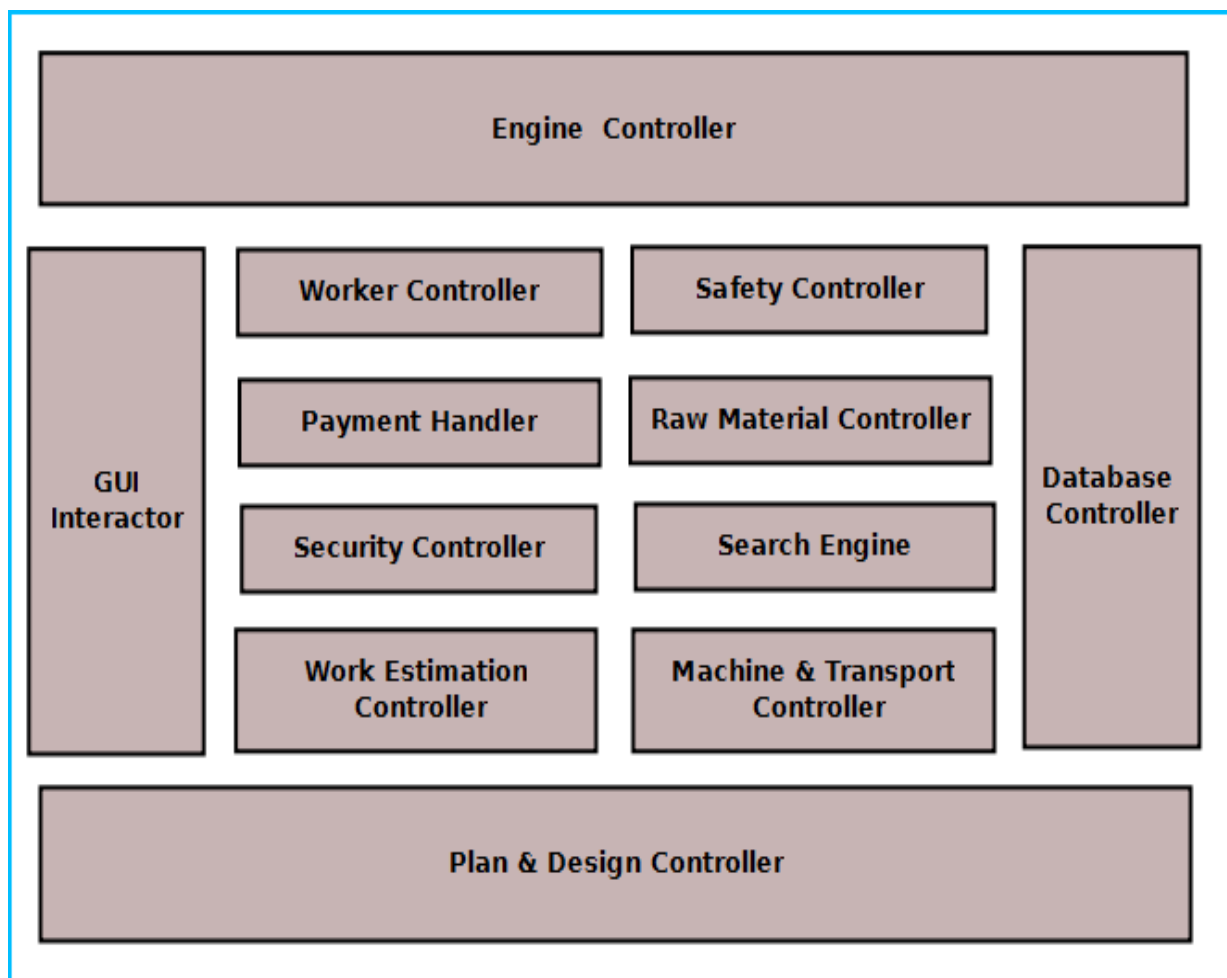


Figure: **Components of Engine**

#### **Engine controller:**

This controls the overall interaction between all the backend modules. It schedules the priority of the actions in case of overlapping. It helps user to consolidate overall reports and print them from GUI.

**GUI Interactor:**

It interacts with the GUI and polls GUI calls. It exposes APIs and events for GUI to use. GUI Interactor helps Engine to maintain wrapper around the Engine modules so that the GUI can be ported to any other framework without much changes in Engine code.

**Database Controller:**

It controls the database interactions. It forms query to fetch information from the database. It also sends data to be saved in database for future use.

**Plan & Design Controller:**

It allows integration with other designer software to view the design. It processes the design comments and helps generating reports.

**Worker Controller:**

It keeps track of worker information. It has an algorithm for maintaining worker data like

- Attendance information
- Work hours
- Area of expertise
- Payment details
- Personal data

All these data will be saved and are available for other modules to use and modify.

**Security Controller:**

It saves information for security measures. It can send it to the authority or police whenever required. It will ensure state of the existing security measures and generate warning if one of the steps is breached.

**Safety Controller:**

It ensures the safety of the construction site. It controls the safety alarms, fire alarms and instructions to be displayed at the hazardous places.

**Work Estimation Controller:**

This will allow users to estimate future work depending on the design, deadline and workers expertise. It will have algorithms to control estimation and assignment of work to the workers.

**Raw Material Controller:**

This module will maintain the information about raw materials. It will derive the figures about available materials, required amount to meet requirements, purchase deadline and allowable stock. It will save the information in database and retrieve them when required.

**Search Engine:**

Search engine enables rapid and efficient searching of data about workers, raw materials and suppliers. Search Engine prepares search indexes depending most accessed data. It improves the efficiency and performance of the software.

**Payment Handler:**

Payment Handler allows generating the report for material purchases. It calculates the salary of a worker. It will get the work & salary information from the database depending on worker data and calculates the payable amount.

**Machine & Transport Controller:**

This module keeps track machine to be used by the construction workers, machine purchase or hiring information, vendor information. This also handles logistics transport, worker transport.

***Construction Management System Database***

Construction Management System will maintain a centralized database for storing information. We will design a RDBMS to manage the database and engine interaction. It will have optimized design and archive older data to save space and increase performance.

**Hardware & Software Requirements for the application to run****Hardware Requirements**

Computer that has a 1.6GHz or faster processor	Security Cameras
1 GB (32 Bit) or 2 GB (64 Bit) RAM	Barcode Reader
10 MB of available hard disk space	Report Printing Machine
DVD-ROM Drive / USB Port	Webcam
Weight Machine	

**Software Requirements**

Windows XP (x86) with Service Pack 3 / Windows Vista (x86 & x64) with Service Pack 2 / Windows 7 (x86 & x64)
Microsoft .NET 4.0
Windows WPF & WCF

## Project Structure:

### *Project Estimation:*

Task Group	Task	Duration ( Man-Days)
Construction management GUI	Design & Plan viewer	40 days
	Work Planner Interface	
	Payment Interface	
	Product Stock & Price Info browser	
	Customer Management Interface	
	Material Management Interface	
	Worker Management Interface	
	Safety & Security Management Interface	
Construction management Engine	Engine controller	50 days
	GUI Interactor	
	Database Controller	
	Plan & Design Controller	
	Worker Controller	
	Work Estimation Controller	
	Raw Material Controller	
	Machine & Transport Controller	
	Payment Handler	
	Search Engine	
	Safety Controller	
	Security Controller	
Construction management Database	Database Design	30 days
	Database Implementation	
	Optimization	
Integration	Application Integration	20 days
	Creating Installer	
Testing	Unit Testing	20 days
	Integration Testing	
	Regression Testing	
	System Testing	
Documentation	Synopsis	20 days
	Design Document	
	Help Document	

***E-R Diagram:***

We will design a RDBMS for Construction Management System. The entities and their attributes are listed below. Attributes in Bold letter is the unique key.

Entities	Attributes
Worker	<b>User Id</b> , Name, Address , Contact Number, skillset, Photo ID Num, Photo
Construction Management System	<b>Construction site Id</b> , Name, Address, Registered no
Construction Machine	<b>Machine Id</b> , Name, purpose
Work Session	<b>Session Id</b> , <b>worker Id</b> , Time, Expense amount
Engineer	<b>engineer Id</b> , Name, address, contact number
Design Preference	<b>Preference Id</b> , Type, Description
Raw Material	<b>Product id</b> , stock, name, price

**Relationship between Entities:**

- ❖ Construction Management System has Workers → 1 : N
- ❖ Construction Management System has Machines → 1 : N
- ❖ Workers does Work Session → 1 : 1
- ❖ Construction Management System manages Raw Material → 1 : N
- ❖ Engineer provides Design Preferences → M : N

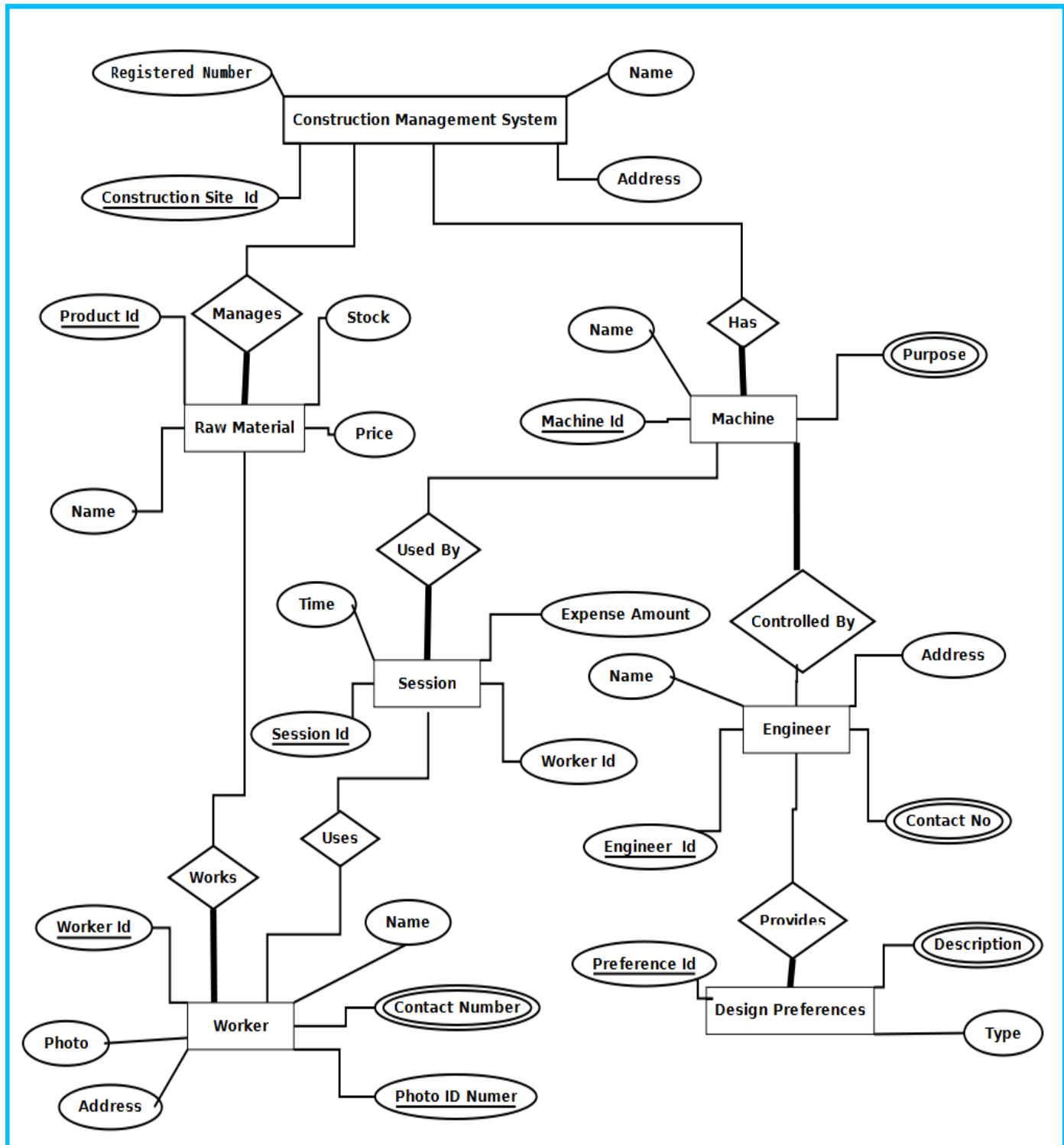


Figure: E-R Diagram of Construction management system

## **Tools/Platforms used (Hardware/Software):**

### **Hardware:**

- ❖ Laptop with 2GHZ processor
- ❖ 2 GB RAM
- ❖ 320 GB hard disk (NTFS File System)

### **Software:**

- ❖ Windows XP (x86) with Service Pack 3 / Windows Vista (x86) with Service Pack 2 / Windows 7 (x86)
- ❖ Microsoft .NET 4.0
- ❖ Windows Presentation Framework(WPF)
- ❖ Windows Communication Framework(WCF)
- ❖ Visual Studio 2010 Express Edition (IDE)
- ❖ MySQL database
- ❖ Dia for Diagram Drawing & Modelling.



**Client/Industry:**

**E-Komfort Zone**  
**Bamangachi Station Road,**  
**P.O: Bamangachi, P.S: Barasat,**  
**Dist: North 24 Pgs**  
**West Bengal- 743706**

## **Future Scope and Further enhancement of the project:**

- To sink with multiple Construction sites with a centralized database.
- To support UNIX / Linux, MAC OSX Operating systems.

----- Thank You-----