Intelligent Online Education Transformation System

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Abstract

This paper presents a novel approach for on-line education system. The intelligent on-line education system is an asset to the Sharda group of institution, India developed as an in-house project. It gives the faculties on-line attendance monitoring on the basis of on-line time table, on-line leave fillings, manage substitute lecture, help desk and complete learning management system to create assignments, quiz and give study material with marking. The system supports student to view attendance, marks, manage assignments and quiz. On other hand the administrative part includes creation of courses, enrolls student, register faculty, assign subjects, manage and create time table, overall help desk management system. The system is completely discussed in the paper considering above points.

***Keywords*:** *education system, learning management system, quiz, attendance, leave, help desk.*

1. Introduction

In today's traditional education system students participating experience dissatisfaction due to lack of interaction, inappropriate course content and insupportive learning [9]. It is important for the faculty to design and transform on-line education system which can respond to cultivate environment and experience for student satisfaction [1]. Online education provides classroom independence, twenty four hours instructor support, on-line study material, practice quiz, complete student academics monitoring and many more features which provides intelligibility and better flexibility to the current scenario of education system. In the web based education the faculty has the complete logging data which can be compared to get the analysis of student improvement. On-line education systems are relatively young and many companies are working to improve the intelligence and adaptive functionalities so that the education becomes more comfortable and enjoyable [4]. The features that should be included in the on-line education system: page sequencing and question sequencing. This sequencing algorithm must be based on problem solving technology to support the faculty for developing new and exciting research. In current scenario of education system Research is one of the key functionality to improve quality of learning and knowledge [10]. For Developing Intelligent On-line Education system two type of system has to be considered: Administrative and Academic. The Administrative component includes creating courses, timetables, consulting teaching materials, enrolling students on courses, registering and un-registering teachers and students. Academics components on other hand aims on facilitating faculty for distance learning and individualize one to one guidance [3].

The key points considered for developing an on-line education system which simulates real teaching in both facets are:

1. The Education system must have graphic interface which is user friendly.
2. The design of web pages is standard so that any unknown person arrive can handle it easily.
3. Only the necessary data is loaded so that time is saved between server pages to the client and resources.
4. The intelligent education system should give each student its own learning environment.

2. Intelligent and On-line education system

2.1. Intelligent education system

The developed software is a learning management system which aids faculty to implement on- line contents which saves time, provide fast access to knowledge and information anywhere at any time. Intelligent learning motivates the students to have on-line discussion, virtual classes, self monitoring and mentoring [13]. Intelligent on-line facilities learning must provide complete teaching aids to the system considering the given points. The developed system is a in- house system which motivates and cultivate Research work [2].

2.2. On-line education system

In present social and technological advancement on-line education system practices via internet provides improvement in efficiency and effectiveness of education. The developed intelligent system is web based which can run both on internet and Intranet according to the requirement [17]. The objectives behind the developed system states to reduce learning costs. to create smart

teaching and learning which is very important in the present and up-grooming environment. The developed on-line system gives a meaning full interactivity between the student and faculty [18].

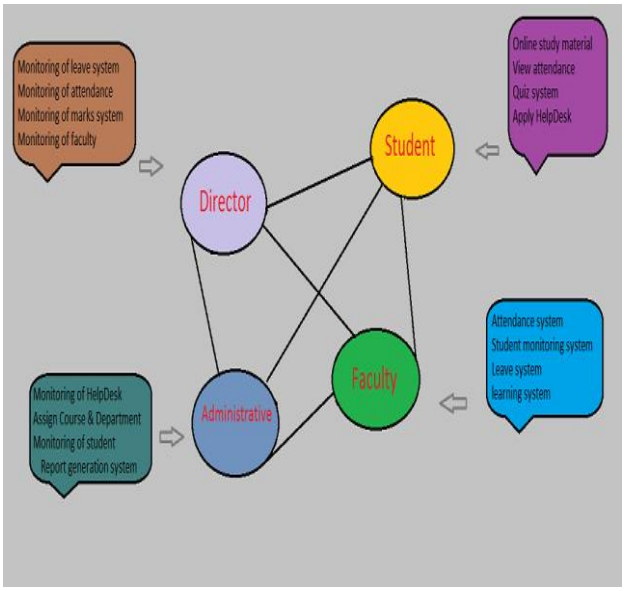


Fig.1 Model of the system

3. System Architecture and Design

The education system Fig. 1 is based on three layer systems which are represented as presentation layer, business logic layer, and database layer [14].

3.1. System in presentation layer

The developed education system using Microsoft platform is based on Microsoft tools. The front end components which provides the presentation logic is developed using standard asp.net WebPages, Ajax tool-kit, asp.net tools library and css (cascading style sheets) sheet. On the back end of the presentation layer for interaction and intelligence Csharp is used which is completely object oriented programming language. This presentation layer is the interface between the client and the software that is implemented on World Wide Web protocol using asp.net framework [7].

3.2. System in Business logic layer

In the second Business logic layer there is connection between client and the data server. In this logic layer entity framework is used which an object relational is mapping that gives secures connection between the client and the server.

3.3. System in Data access layer

The data access layer provides access to database using entity framework which is an object/relational mapping ORM. It is advancement to the Ado.net framework which gives developer flexibility and reduces code for retrieving and manipulating data. ORM includes three parts that are domain class objects, relational database object and mapping information's.

3.4. Login Security Design

The login module is in the home page used by the portal to secure the website from un-authenticated user. By providing login controls authorized user can access links and navigation paths of the website according to the role. In the system for developing the authenticated user access to the system built-in sever control available in Asp.net 4 is used which is known as login control. Login control provides three types of authentication.

3.4.1. Membership services

The login control has membership services given as creating new users, allowing users to create and reset password and creating unique identification for the authenticated users.

3.4.2. Managing roles and users

For managing roles and users web administration tools WAT is used, which provide to assign user specified roles such as administer, director, faculty and student. By managing these roles the system is able to provide different permissions and access to folders in the system.

3.4.3. Customized user profiles

To create customized user profile web configuration files is modified where a profile is specified, which is an underlying class that performs low level task of storing and retrieving profile data. By applying user profile personalized website portal is created where the user can view his/her name, roles, emails Id and can change passwords.

3.5. Database Design

The developed education system uses database integration between visual studio 2010 and Microsoft Sql Server 2008 R2 database Fig. 2, which is modified by using Entity framework, allows to create a new database class file. Entity framework database design can be done by code or

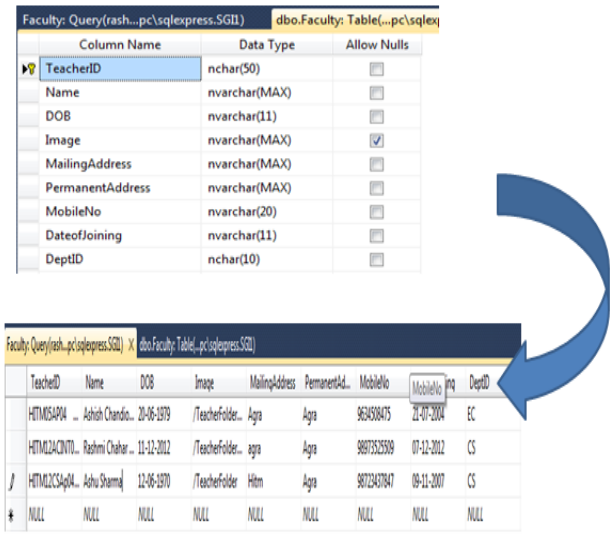


Fig. 2. Declaration and Definition of tables

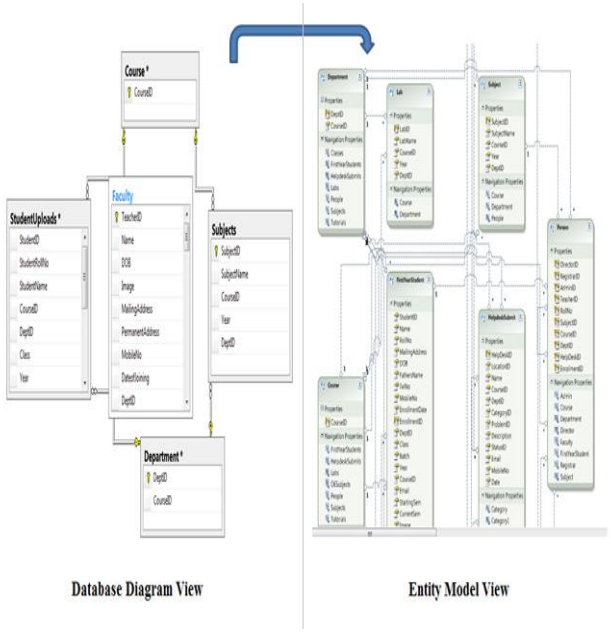


Fig. 3. Conversion of SQL Database into Entity Database

by entity framework designer tool shown in Fig. 3. This tool is used to visually create, modify entities, association, and mapping and inheritance relationship. The file developed is named as .edmx file which is integrated with visual studio components. In this file entity data model is created, updated and database is implemented by using entity designer wizard. The entity designer wizard consists of following components.

1. In the entity designer a visual design ID is provided, which allows editing, creating, modify or delete entities and associations for conceptual model.
2. A mapping window is provided in entity design for mapping entity types or association to database tables, columns and store procedures.

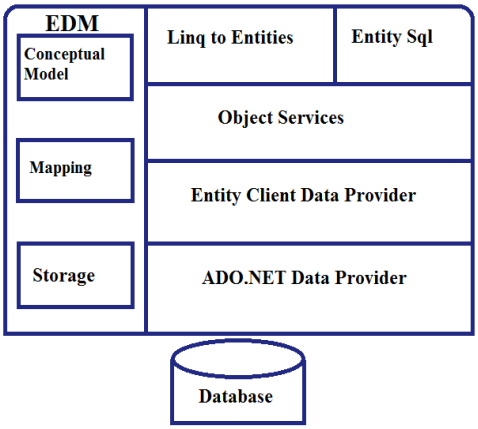


Fig. 4. Entity framework data model

3. A model browser window provides tree views of conceptual model and storage model.
4. A toolbox is provided for creating entities, association and inheritance relationship.

3.5.1. Entity framework data model Architecture
The entity framework data model has three main parts and their services Fig. 4.
1. Conceptual model: Conceptual Model is the model classes and relationship. It is independent from the database table design which only has entities.
2. Storage Model: Storage model is database model which includes tables, stored procedures and their relationship.
3. Mapping Model: Mapping model is used to map conceptual model to the storage model.
4. Linq to entities and entity Sql are two query languages to write query for object models which gives entities defined in conceptual model.
5. Object service is a layer responsible for accessing data from the database having to and fro motion. It converts entity client data in to entity object data structure.
6. Entity client data provider is used to convert link to query into sql queries.
7. ADO.NET data provider ia a last layer in the model diagram which is used to communicate between the database and entity model for sending or retrieving data using ado.net framework. In the proposed system a database is created with sql schema and then converted into EDM model as defined above. This gives

programming flexibility, easy implementability and extendibility. The model is created using entity designer framework having 42 tables which are converted into object classes for entity mapping. The tables are divided into groups like security, administrative, Academics comprising both for student and faculty. These tables are associated to each other. The association is done on the basis of keys to interlink relationship between entities.

3.6. Visual Application Design

For web portal Design a better look and feel environment must be provided, also flexibility for data visualization is to be implemented. The proposed portal is created using asp.net framework 4 which fulfills the front-end attachment requirements to give look ups like colour, fonts, layouts, navigation, site movements, menus and data integration. The complete site page movement template in asp.net is provided by master page. It is a mark-up page that is common among all content pages and is customizable. By using master pages in the proposed education portal a common appearance is given with easy updating and design. To give master pages site navigation using asp.net in the given portal custom site-map provider is implemented that stores site-map data in a file with an extension .site-map which has the complete URL with site-map node added for pages in the website for navigation. A cascading style sheet provides a way to control the website of a web page without changing its structure. The CSS is used to provide visual attribute such as colours, margins, headers, fonts, logos, pictures and menus styles. For the proposed education system custom cascading style sheets is used according to specified roles giving appropriate look up. Menu and sub-menus is a common tool in a web application but has the importance that can navigate internally in a web page. By these menus a particular user can have access to different functional pages. To create interactive and dynamic web pages that the user can send values and retrieve values, web forms are needed. But for displaying and browser access static web pages are used in the proposed education portal asp.net web control are inserted which are graphical object that allows the user to interact with functionality. There are many control for various propose, the insertion and use is left for the software developers. These controls in asp.net application are defined in the system.web.UI web control name space of the system.web.Dll assembly. Special control like validator is used in the portal to validate some values at various levels. Ajax Control tool kit contains rich set of controls that can be used to build highly responsive and interactive web applications. The Ajax contains more than 40 controls like calendars, auto complete, colour pickers, tab panel and many more. Using these controls in the Portal has given new dimension for interaction.

4. System Application role

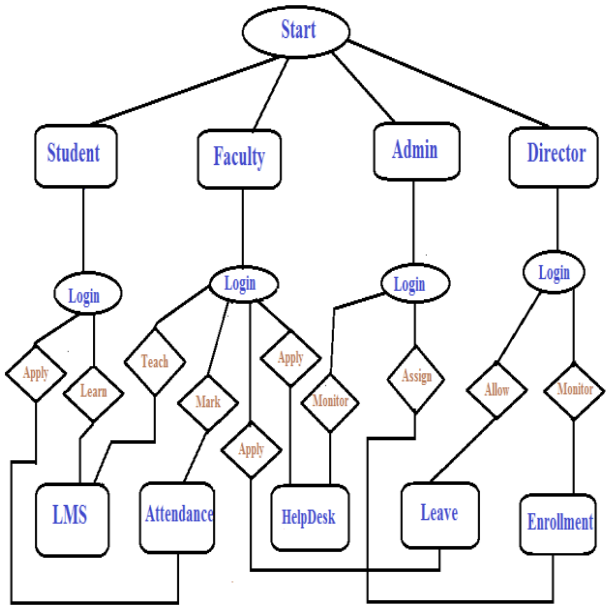


Fig. 5. Roles and Applications

The education system portal has four main user levels Administrative, Director, Faculty and Student Fig. 5. The Administrative role has full privilege of database management which has rights to modify add and delete table entries and manage other users with assign roles. The second role is the director role which has the complete monitoring rights of viewing the each role functionality. The third role is faculty as an employee where this user can monitor education and administration related to student activities defined in its profile. The last anonymous role student which is at the bottom of hierarchy under the control of faculty, administrative

4.1. Administrative control

The on-line system decision making at the micro level is provided in the system which helps management of the organization to take corrective action for the problems [12]. For this purpose, in the developed Education System two Admin levels are present, the Administrative page start-up is provided with the grid-view controls which include current date records and Help-desk system with full details. The administrative role has complete CRUD rights to form new courses to the institution and add new departments as well as subjects. The timetable once created by the individual departments is loaded. According to the timetable the attendance system is filled by respective faculty. The administrative has the privilege for

enrolling students and requesting employee's details. The leave system is the backbone of the administrative module which is dynamically managed as per load assign and add substitute. The complete leave system is under the second control of Director role which is handled by Director assistant login. Other than control the Director role has monitoring power, virtually to view the scheduled classes, its attendance, completion and performance [8].

4.2. User Control

In the developed Education system two type of user role defined, these are faculty and student. Virtual classes is provided where faculty upload assignment and study material, take quiz, mark attendance, update student achievement and update information of self. Faculty can apply leave on-line and add/update substitute. Student is the base bottom of the developed education system. Student can download and upload assignment, download study materials, give quiz and view attendance. Both users can register problem in the Help-desk according to their respective departments. An interactive platform is given in the current system where student and faculty integrate each other [15].

5. Modules

In the web based on-line education system various modules are developed one by one. Each module has its unique work and control. All the modules are integrated in the single system. These modules are used and managed according to the role specified. Complete education system teaching, learning and management aspects developed in the following modules:

1. Attendance System
2. Leave System
3. Help Desk System
4. Enrolment System
5. Learning Management System

5.1. Attendance System

This module is totally based on timetable which is operated manually and automatically both Fig. 6. First one has to fill the timetable manually and after then it can be created, edited or updated automatically. Operations are highly bounded to the respective departments. Full flexibility is given to the timetable to expand and minimize lectures. Faculty marks attendance according to the timetable and for marking the attendance only those students are populated, which is assign to the subjects. Attendance can be edited and updated on the given date.

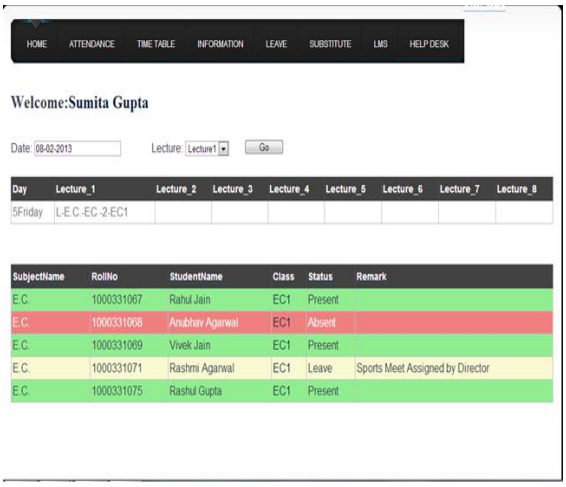


Fig. 6. View of Attendance System

5.2. Leave System

This module is monitored under the eye of Director role Fig. 7. Faculty and other staff can apply leave on-line. All the information regarding leave and substitute has given in the module like: types of leave, number of leave, substitute information, substitute timetable, substitute id number etc.

The process of leave sanction is three ways process, first leave has to accept by one person as substitute which is one of the same departments, then leave has to be assigned by director role and then acceptance will go to the requested faculty. Substitutes can fill the attendance of requested faculty by its login only. This module results in time saving in the education system and provides online interactivity for leave system.

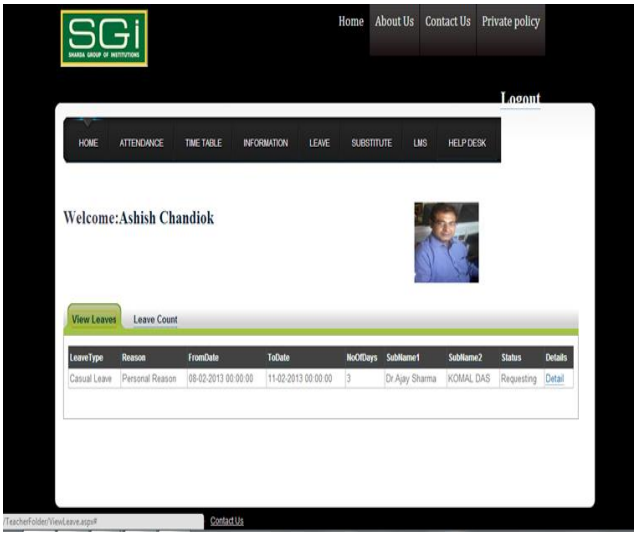


Fig. 7. View of Leave System

5.3. Help-desk System

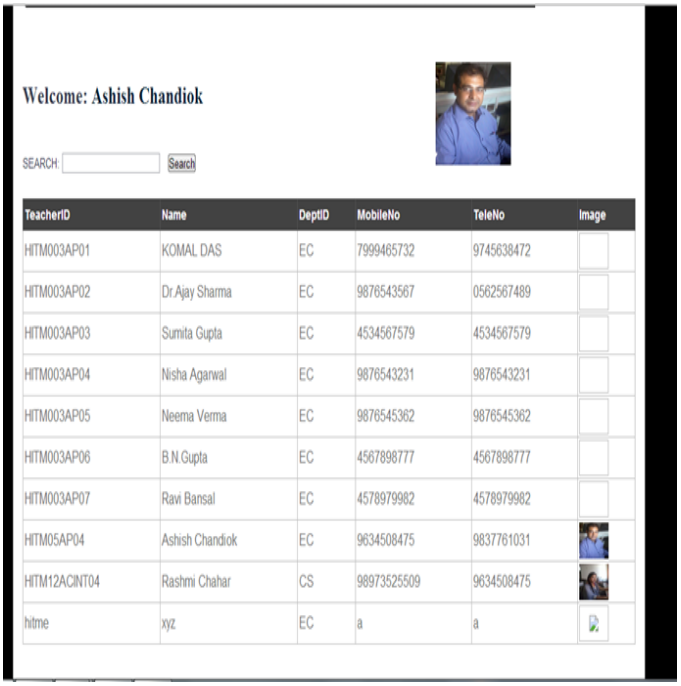
This is very unique system developed for all the roles and other staff of institution Fig. 8. For applying any problem in the help desk system a simple request form is filled by the user and then send to the system. The electronic mail message is delivered to the faculty in form as an acknowledgement. This electronic mail is delivered automatically when problem is registered in the Help Desk

Date	HelpDeskID	LocationID	CategoryID	ProblemID	Description	StatusID
08-02-2013 00:00:00	1	701	Software	Need More Computers	Kindly Send More Computers in 701.	Requesting
08-02-2013 00:00:00	2	702	Hardware	Virus	Need AntiVirus For Computers.	Requesting
08-02-2013 00:00:00	3	702	Departmental	Need More Cabins	Urgently Required	Requesting
08-02-2013 00:00:00	4	702	Others	Personal	Kindly Apply Leaves due to some Medical Problems.	Requesting
08-02-2013 00:00:00	5	701	Software	Need More Computers	Need 20 DSP kit Urgently.	Requesting

Fig. 8. View of Helpdesk System

5.4. Enrolment system

This module is developed for student admission and enrolment Fig. 9. System provides facilities to Admit and Enrolls the student. Basic information of students are update automatically in the system. Various laboratories, tutorials, regular subjects and open elective subjects are assigned to the student. The collected data can then be utilized to evaluate quality, performing analysis and suggest alternatives for decisions [6].



TeacherID	Name	DeptID	MobileNo	TeleNo	Image
HITM003AP01	KOMAL DAS	EC	7999465732	9745638472	
HITM003AP02	Dr.Ajay Sharma	EC	9876543567	0562567489	
HITM003AP03	Sumita Gupta	EC	4534567579	4534567579	
HITM003AP04	Nisha Agarwal	EC	9876543231	9876543231	
HITM003AP05	Neema Verma	EC	9876545362	9876545362	
HITM003AP06	B.N.Gupta	EC	4567898777	4567898777	
HITM003AP07	Ravi Bansal	EC	4578979982	4578979982	
HITM05AP04	Ashish Chandiok	EC	9634508475	9837761031	
HITM12ACINT04	Rashmi Chahar	CS	98973525509	9634508475	
hitme	xyz	EC	a	a	

Fig. 9. View of Enrollment system

5.5. Learning Management System

This system provides a virtual environment for teaching and learning process Fig. 10. It provides interactivity between the student and faculty. Faculty can upload assignment, provide study materials and take quiz via this LMS system on the other hand student can download and upload assignment, give quiz, download study material [16].

6. Conclusions and Future Work

In the proposed work an intelligent web based solution for education system is developed. This system is having complete functionality for efficient management and information retrieval in institution. The aim of the portal is to reduce the complexity in teaching by providing internet and Intranet based application. The main conclusion is the design is having graphical interface with specified look and feel environment for each user. The portal supports monitoring as well as administrative smooth working in the information retrieval. The given system uses very less data transaction between the

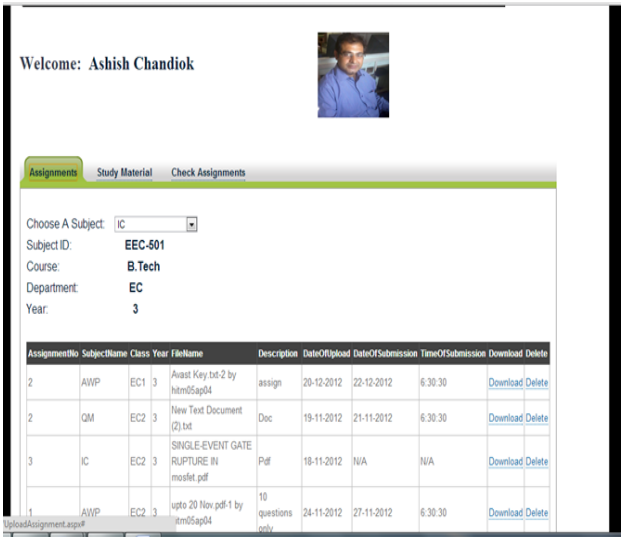


Fig. 10. View of learning and management system

server and the client so it removes high bandwidth requirement for web services. Complete security for login as well as database is applied by using membership, roles and profiles in consideration to logins, entity data model for data base handling. The anonymous users have complete interaction with the portal and between the system modules, so that student and faculty user can interact with each other as well as administrator. So the portal is an intelligent system having optimized education information utilization considering speed and time complexity, facilities, environment and security.

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