

**COMPUTER-BASED TIME TABLE INFORMATION SYSTEM
(A CASE STUDY OF THE INSTITUTE OF MANAGEMENT AND
TECHNOLOGY [IMT], ENUGU)**

BY

UDEH OBUMNEME KINGSLEY

IMT/CS/N2014/002

**A PROJECT SUBMITTED TO THE DEPARTMENT OF COMPUTER
SCIENCE, SCHOOL OF TECHNOLOGY, INSTITUTE OF
MANAGEMENT AND TECHNOLOGY (IMT), ENUGU**

**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
AWARD OF NATIONAL DIPLOMA (ND) IN COMPUTER SCIENCE**

SUPERVISOR: MR. ORDI IFEANYI

OCTOBER, 2016.

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CERTIFICATION PAGE

I certify that this is an original project work carried out by UDEH OBUMNEME KINGSLEY with the Reg. No. IMT/CS/N2014/002 under the supervision and guidance of Mr. Ordi Ifeanyi .I

Mr. Ordi Ifeanyichukwu .I

Supervisor

Date

APPROVAL PAGE

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The department Board of Examiners declares as follows:

That this work is accepted in partial fulfillment of the requirements of National Diploma (ND) in Computer Science.

Mr. Ordi Ifeanyichukwu .I

(Supervisor)

Signature

Date

Mr. G.O.C Ugwuanyi

(H.O.D)

Signature

Date

(External Examiner)

Signature

Date

DEDICATION

I dedicate this research work to God Almighty for His infinite mercy towards me and to my family for their support during my stay in school.

ACKNOWLEDGMENTS

I acknowledge God for his infinite love and mercy upon me.

To my project supervisor, Mr. Ordi Ifeanyichukwu .I, I say a big Thank You for your kindness, patience and guidance throughout this research work.

I appreciate the efforts of my HOD, Mr. G.O.D Ugwuanyi and all my lecturers: Mr. Aneke, Mrs. Nnadi, Engr. Nwachukwu, Mrs. Okorie, Mr. Onochie, Mrs. Eze, Mrs. Ozoalor, Mr. Aniekwe and Mrs. Enenwata towards moving Computer Science Department to a greater height. May God almighty reward you abundantly for your support.

My late dad Mr. Richard A, Udeh, dear and mum Mrs. Esther N, Udeh, siblings Ebuka, Ifunanya, Ogugua, Udeh e.t.c are sincerely acknowledged. You are the best people I ever had. I am not forgetting my uncles, relatives and every other member of my extended family. I love you all. Thanks for your support and may God bless you all for all the support you offered me throughout my academic.

The social support of my friends and course mates is also appreciated.

Finally, I acknowledge every other person that has contributed to my success so far and that of this project whose name has not been mentioned in this page. God bless you all.

ABSTRACT

This research was carried out to analyze and propose a time table information system to the Nigerian institutions. Lack of proper time management leads to loss of fund, lack of trust and so on. When an institution or an organization lacks proper time management, there is no room for progress in that institution or organization. Challenges of time table creation has been a big challenge in Nigeria and that is where this research work is centered. Time table information system is an automated time table processing system, used to generate time tables for institutions, and any other organizations or government or public agency that makes use of time table schedule to track their daily activities. This system will be able to shuffle the total number of courses and time in other to accommodate all the courses and assign them to a specific time to avoid clash of activities. The system can only be updated by the admin following any increment in the number of lectures and or lecturers in the institution. The main operation and reshuffling will be carried out by the system while the data will be entered only by the admin that is controlling the system.

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CHAPTER ONE

1.0 INTRODUCTION

Time table scheduling has been in human requirements since they thought of managing time effectively. It is widely used in schools, colleges and other fields of teaching and working like crash courses, coaching centers, training programs etc. In early days, time table scheduling was done manually with a single person or some group involved in task of scheduling it with their hands, which take a lot of effort and time. While scheduling even the smallest challenges can take a lot of time and the case is even worse when the number of challenges or the amount of data to deal with increases. In such cases perfectly designed time table is used for whole generation without any changes, proving to be dull in such situations. Other cases that can cause problem is when the number of employer or workers are weak, resulting in rescheduling of time table. Institutions, schools or universities are regular users of such time tables. They need to schedule their course to meet the need of current duration and facilities that are available to them. However, their schedule should meet the requirement of new course addition and newly enrolled students to fresh batches. This may result in rescheduling the entire time table once again for its entire batches and to be scheduled in shortest possible time before the batches course start.

Another problem that occurs is when scheduling time table for exams. When many batches have exam on the same day, they need to be scheduled effectively taking into account all problems related to facilities that are available to conduct these exams simultaneously. In other to achieve this, the manual time table scheduling demands considerable time and efforts along with lots of paper work. The time table scheduling can also be considered as a Constraint Satisfaction

Problem (CSP), which is a unique concept in artificial intelligence, in which we find a solution that satisfies the given set of challenges. Time table scheduling has been in human requirements since they thought of managing time effectively. It is widely used in schools, colleges and other fields of teaching. In early days time table scheduling was done manually with a single person or some group of people involved in task of scheduling it with their hands, which take lot of effort and time. While scheduling, even the smallest challenges can take a lot of time and the case is even worse when the number of facilities (teaching staff) are less, resulting in rescheduling of time table or they need to fill on empty seats urgently. In such cases automated time table, scheduling can be very convenient method for managing it in computers with Algorithm also proving to be eco – friendly for no paper work.

1.1 Statement of the Problems

The manual system of preparing time table in colleges with large number of students is very time consuming and usually ends up with various classes clashing either at the same room or with the same teachers having more than one class at a time.

These are just due to common human errors which are very difficult to prevent in processes such as these. To overcome these problems people usually take previous years' time table and modifying it but still it is a tedious job to incorporate changes.

1.2 Significance of the Study

To overcome all the problems we propose to make an automated system. The system will take various inputs like details of students, subjects and classrooms and teachers available, depending upon these inputs it will generate a

possible time table, making optimal utilization of all resources in a way that will best suit any of challenges or college rules.

List of subjects or courses may include electives as well as core subjects. The case is similar to schools and other educational institutions. So our aim is to develop a general purpose time table generator which can efficiently generate optimal solution based on the subject matter.

1.3 Scope of the Study

Planning time table is one of the most complex and error – prone applications. There are still serious problems like generation of high cost time tables are occurring while scheduling and these problems are repeating frequently. Therefore there is a great requirement for an application distributing the course evenly and without collisions.

Our main aim here is to develop a simple, easily understandable, efficient and portable application, which could automatically generate good quality time tables within seconds.

1.4 Aims and Objectives of the Study

The main aim and objective of our project are:

1. The final system should be able to generate time tables in completely automated way which will save a lot of time and effort of an institute administration.
2. To make a time table system generic so that it can work equally well for different school, colleges and universities.
3. User defined handling.

4. Ease of use for user of system so that he or she can make automatic time table.
5. Focus on optimization of resources i.e. teachers, labs and rooms etc.
6. Provide a facility for everyone to view time table.
7. Generate multiple useful views from time table.

1.5 LIMITATIONS OF THE STUDY

This research work was limited by a number of factors some of which include:

First, most of the academic and non-academic staff of the institute that was contacted were unwilling to give out certain information in order not to release their mode of operation in the school. This left the researcher short of information. However, with free information gotten from the Internet and libraries, the researcher was able to augment the little information gotten from field work to ensure a successful research.

Furthermore, economic factors limited this study. As a student, the researcher lacked enough money to carry out this project in a bigger way. Money needed for transport fare, purchase of textbooks and downloading of internet materials was not always there. However, the researcher made use of free and affordable materials to arrive at this comprehensive report.

Time was also a limiting factor. The researcher had limited time to carry out this research work as the research went on along with other academic activities. However, the researcher managed her time efficiently to complete the research work timely.

1.6 Definition of Terms

ALGORITHM: A precise step by step plan for a computational procedure that possibly begins with an input value and yields an output value in a finite number of steps.

AMENITIES: The quality of being pleasant or agreeable, whether in respect to situation, climate, manners, or disposition, pleasantries etc.

AUTOMATED: Done by machine.

BATCHES: A group or collection of things of the same kind, such as a batch of letters or next batch of steps.

BROADCAST: To transmit a message or signal via radio waves or electronic means.

CALENDAR: Any system by which time is divided into days, weeks, months and years.

CONSTRAINTS: A condition that a solution to an optimization problem must satisfy.

CSP: Constraint Satisfaction Problem.

ENTITIES: Anything about which information or data can be stored in a database; in particular, an organized array or set of individual elements or parts.

GENERATION: The fact of creating something or bringing something into being.

I/O: input and Output.

LOGISTICS: The process of planning, implementing, and controlling the efficient, effective, flow and storage of goods, services and related information

from their point of origin to point of consumption for the purpose of satisfying customer requirements.

SCHEDULE: A time table, or other time – based plan of events; a plan of what is to occur, and at what time.

SLOTS: A gap in a schedule or sequence.

TASK: A piece of work done as part of one's duties

TERMINAL: In the context of computer hardware, a device for entering data into a computer or a communications device equipped with a keyboard and some sort of textual display.

CHAPTER TWO

LITERATURE REVIEW

According to Scharf, A. (2015), A survey of automated time-tabling A Scharf – Artificial intelligence review, 1999 has given the time tabling problem consist in scheduling a sequence of lectures between teachers and students in a prefixed period of time (typically a week), satisfying a set of challenges of various types. A large number of variants of the timetabling problem have been proposed in the literature, which differ from each other based on the type of institution involved (University or school) and the type of challenges.

According to M.K. Patil, et al (2014), Auto Time – Table Generator – Application for Automatic time table generation (2014) has given a system, which would mechanically generate time table for the different courses of the institute.

Strong Challenges

1. More than one lecture cannot be allowed at a class room at the same time.
2. A lecturer cannot teach more than one class simultaneously.

Weekly Challenges

1. The lecturers are not allowed to time slots which come under the lecturer's prohibited time zones.
2. The class should schedule in accordance with the lecturer's favored time zone.

A research which was done by E.K. Burk has focused on university timetabling problems. Such problems can be dividing into two main categories: Course timetabling and exam timetabling. These problems are subject to many challenges.

1. No resource (student or staff) can be demanded to be in more than one place at any one time.
2. Professors may prefer to have all their lectures in a number of days and to have a number of lecture free days.
3. For each period, there should be sufficient resources available for all events that have been scheduled for that time.
4. One course or exam may need to be scheduled before or after the other.
5. Students should not have exams in consecutive periods or two exams on the same day.

A research which was done by Carriff, has given automated taxi booking and scheduling system for the taxi in Amman. The system provides a convenient, assured and safe booking for both taxi drivers and registered customers through mobile devices.

According to Hojjat Adeli, Asim Karim, Construction Scheduling, Cost Optimization and Management (2003), A schedule or a timetable, as a basic time-management tool, consists of a list of times at which possible tasks, events, or actions are intended to take place, or of a sequence of events in the chronological order in which such things are intended to take place. The process of creating a schedule - deciding how to order these tasks and how to commit resources between the varieties of possible tasks - is called scheduling, and a person responsible for making a particular schedule may be called a scheduler. Making and following schedules is an ancient human activity.

Some scenarios associate "this kind of planning" with learning "life skills". Schedules are necessary, or at least useful, in situations where individuals need to know what time they must be at a specific location to receive a specific service, and where people need to accomplish a set of goals within a set time period.

Schedules can usefully span both short periods, such as a daily or weekly schedule, and long-term planning with respect to periods of several months or years. They are often made using a calendar, where the person making the schedule can note the dates and times at which various events are planned to occur. Schedules that do not set forth specific times for events to occur may instead list algorithmically an expected order in which events either can or must take place.

In some situations, schedules can be uncertain, such as where the conduct of daily life relies on environmental factors outside of human control. People who are vacationing or otherwise seeking to reduce stress and achieve relaxation may intentionally avoid having a schedule for a certain period of time.

Kinds of Schedules

Publicly available schedules

Certain kinds of schedules reflect information that is generally made available to the public, so that members of the public can plan certain activities around them. These may include things like:

1. Hours of operation of businesses, tourist attractions, and government offices, which allow consumers of these services to know when they can obtain them.
2. Transportation schedules, such as airline timetables, train schedules, bus schedules, and various public transport timetables are published to allow commuters to plan their travels. From the perspective of the organization responsible for making transportation available, schedules must provide for the possibility of schedule delay, a term in transport modeling which refers to a difference between a desired time of arrival or departure and the actual

time. Despite the use of "delay", it can refer to a difference in either the early or late direction.

3. In broadcast programming, the minute planning of the content of a radio or television broadcast channel, the result of that activity is the generation of a list of shows to be broadcast at regular times or at specific times, which is then distributed to the public so that the potential audience for the show will know when it will be available to them.
4. Concerts and sporting events are typically scheduled so that fans can plan to buy tickets and attend the events.

Internal schedules

An internal schedule is a schedule that is only of importance to the people who must directly abide by it. It has been noted that "groups often begin with a schedule imposed from the outside, but effective groups also develop an internal schedule that sets goals for the completion of micro-tasks". Unlike schedules for public events or publicly available amenities, there is no need to go to the time and effort of publicizing the internal schedule. To the contrary, an internal schedule may be kept confidential as a matter of security or propriety.

An example of an internal schedule is a workplace schedule, which lists the hours that specific employees are expected to be in a workplace, ensure sufficient staffing at all times while in some instances avoiding overstaffing. A work schedule for a business that is open to the public must correspond to the hours of operation of the business, so that employees are available at times when customers are able to use the services of the business. One common method of scheduling employees to ensure the availability of appropriate resources is a Gantt chart. Another example of an internal schedule is the class schedule of an individual student, indicating what days and times their classes will be held.

A schedule may also involve the completion of a project with which the public has no interaction public prior to its completion. In project management, a formal schedule will often be created as an initial step in carrying out a specific project, such as the construction of a building, development of a product, or launch of a program. Establishing a project management schedule involves listing milestones, activities, and deliverables with intended start and finish dates, of which the scheduling of employees may be an element. A production process schedule is used for the planning of the production or the operation, while are source schedule aids in the logistical planning for sharing resources among several entities.

In such cases, a schedule "is obtained by estimating the duration of each task and noting any dependencies amongst those tasks". Dependencies, in turn, are tasks that must be completed in order to make other tasks possible, such as renting a truck before loading materials on the truck (since nothing can be loaded until the truck is available for things to be loaded on). Scheduling of projects, therefore, requires the identification of all of the tasks necessary to complete the project, and the earliest time at which each task can be completed. In creating a schedule, a certain amount of time is usually set aside as a contingency against unforeseen days. This time is called scheduling variance, or float, and is a core concept for the critical path method.

In computing

Scheduling is important as an internal process in computer science, wherein a schedule is a list of actions from a set of transactions in databases, and

scheduling is the way various processes are assigned in computer multitasking and multiprocessing operating system design. This kind of scheduling is incorporated into the computer program, and the user may be completely unaware of what tasks are being carried out and when. Scheduling operations and issues in computing may include:

1. The operation of a network scheduler or packet scheduler, an arbiter program that manages the movement of certain pieces of information in the computer.
2. Open-shop scheduling, Job Shop Scheduling, Flow Shop Scheduling Problem, optimization problems in computer science.
3. I/O scheduling, the order in which I/O requests are submitted to a block device in operating systems.
4. Job scheduler, an enterprise software application in charge of unattended background executions.

In wireless communications

Wireless networks should have flexible service architecture to integrate different types of services on a single air-interface because terminals have different service requirements. On top of the flexible service architecture, effective QoS management schemes are also needed. Therefore, wireless resources need to be shared among all terminals carefully and it is desirable to schedule the usage of wireless resources as efficiently as possible, while maximizing the overall network performance.

In operations research

The scheduling of resources, usually subject to constraints, is the subject of several problems that are in the area of research known as operations research, usually in terms of finding an optimal solution or method for solving.

For example, the nurse scheduling problem is concerned with scheduling a number of employees with typical constraints such as rotation of shifts, limits on overtime, etc. The travelling salesman problem is concerned with scheduling a series of journeys to minimize time or distance. Some of these problems may be solved efficiently with linear programming, but many scheduling problems require integer variables. Although efficient algorithms exist to give integer solutions in some situations, most problems that require integer solutions cannot yet be solved efficiently.

CHAPTER THREE

3.0 METHODOLOGY FOR FACT FINDING AND DETAIL DISCUSSION OF THE SUBJECT MATTER

3.1 Methodology for Fact Finding

There are many methods a researcher can adopt for his fact finding from both primary and secondary sources. Some of these methods include: observation; questionnaire; interview; internet browsing; examination of existing manuals, forms and handouts; review of other researchers' projects, to mention but the few. However, the researcher will focus on the particular methods he used for the fact finding process of this project.

The fact finding methods used by the researcher include: library research and browsing methods.

1. **Interview:** The researcher organized a personal interview with some of the academic and non-academic staff of the Institute of Management and Technology (IMT) Enugu in order to get their personal opinion on the subject matter.
2. **Libraries:** The researcher visited IMT Enugu Library, Enugu State and National Libraries in order to study books, journals, newspapers, magazines, CDs and DVDs containing articles related to computer based time table management system.
3. **Internet:** The researcher browsed the internet to get vital information related to the subject of discussion.
4. **Questionnaire:** The researcher constructed and distributed many copies of questionnaire to both academic and non academic staff of the Institute of

Management and Technology (IMT) Enugu in order to get their personal opinion on the subject matter.

5. **Observations:** I observed that due to excess courses being offered by the institution usually clash because there is not enough lecturers and classrooms there by making time table planning very difficult because the planners try to avoid an error of having different lectures at the same time or in the same classroom and assigning the same lecturer 2 different lectures at the same place and time, and this problem usually happens during exam when a course is fixed to be taken two different times which is not possible for an exam to be taken twice and this leads to canceling of the paper and re-fix it another day which was not initially planned for exam to be taken because they have no option than to do it that way in order to achieve their aim.

3.2 Detail Discussion of the Subject Matter

Objectives of Computer Based Time Table Management System.

The main objective of this system is to assist the many institutions and organizations in Nigeria, both private and government parastatals that make use of time table or scheduling processes to fasten their scheduling process and reduce errors and clashing of periods assigned to various activities in their various institutions.

Benefits of the System

Some of the benefits of the computer based time table management system are outlined below:

1. The system has limited usage; this means that not everybody has access to the system, it's only the admin that can make any change to the system, but every user can view the information on the generated timetables.

2. The system is platform independent; this implies that one will be able to use the system to view timetables irrespective of the deployment environment; computers, smart phones, and other handhelds running on varying operating systems, etc will be able to interact with the system successfully.
3. The system is a real-time system. This simply means that the system processes data instantly and gives feedback immediately. This will bring about speedy response to issues by the admin. This also means that a lot of time is saved for the users.
4. The system is not labor-intensive; since it is automated; most tasks are performed by the computer. This saves energy and equally saves cost of employing extra staff to handle certain information collation and dissemination tasks.

Challenges of the System

The major challenges of the computer based time table management system are as follows:

1. Information supplied to the system must be verified and genuine to avoid clash of periods or time set for a particular event.
2. Indeed, the system saves cost on the long run. However, the initial cost (upfront cost) of setting up the system (such as cost of computer hardware, software and human-ware) is usually alarmingly costly.
3. Every user of the system must be computer literate to use the system optimally. This means that if a user is not a computer literate, he might find it difficult to use the system; this will limit its application in effect.
4. Intruders, including hackers and network eavesdroppers can mar or abuse the system by tampering with data contained in the system, denying people

especially the admin access to the system or even misusing information gotten from the system.

5. Similar to the previous point is virus attack. Viruses can compromise data contained in the system.
6. Epileptic power supply definitely limits the application of every computer-based system and the proposed system will not be an exception to such situations.

CHAPTER FOUR

4.0 FUTURE, IMPLICATIONS AND CHALLENGES

4.1 The Future

Information systems are increasing in complexity. There are greater volumes of data, users, processes and transactions. There are greater interdependencies between components. The range of available storage, user interface and computing devices is increasing so producing heterogeneity at the physical system level. The utilization of multiple information sources to solve a problem (or create an opportunity) creates a need for homogeneous access over heterogeneous information sources. The optimal utilization of multiple computing resources demands the creation of a uniform computing landscape. The key to homogeneous access to heterogeneous resources (not only information) lies with metadata. The future of advanced information systems depends on metadata. Metadata is data about data. Metadata can describe a data source, a particular collection of data (a file or a database or a table in a relational database or a class in an object-oriented database), an instance of data (tuple in a relational database table, object instance in a class within an object-oriented database) or data associated with the values of an attribute within a domain, or the particular value of an attribute in one instance. Metadata can describe data models.

Computer based time table information system makes use of information systems and so shares the same future – metadata – as information systems. With the full implementation of metadata in computer based time table information system, time table generation in the system will become more efficient and scheduling of activities in many institutions and organizations that uses time table or schedules will be enhanced.

4.2 Implications

Using the computer based time table information system implies limitless processing of time tables, platform independence, real-time access to information and automation. Time and energy are saved by this system owing to the fact that most actions of the system are automated. However, using the system can equally pose security threats as evil-minded people can submit fake data or information to the admin (i.e. by hackers or network eavesdroppers) to process an inaccurate timetable or to tamper with already generated time table. Also, data and information contained in the system are vulnerable to attack by viruses therefore the system should be properly secured with a strong firewall and antivirus to guard it from hackers, viruses and network eavesdroppers.

When a data or information contained in the system is tampered with, the institution or organization that makes use of the system tend to lose clients or income because the time they setup for an event has been tampered with and this could lead to students missing lectures or exams or the clients of the organization missing out seminars because the time set for that seminar has been tampered with, this will also lead to clashing of lectures or exams or may even cause change of dates of an event without notification because the information contained in the system has been tampered with by hackers, viruses or even network eavesdroppers. With the above mentioned implications that will be a very big loss to the institution or organization so the system needs to be protected.

4.3 Challenges

Unverified information can be submitted to the system by evil-minded individuals. In addition, the initial cost (upfront cost) of setting up the system (such as cost of computer hardware, software and human-ware) is usually alarmingly costly. Furthermore, illiterate users might find it difficult to use the system; this

will limit its application in effect. Intruders, including hackers and network eavesdroppers can mar or abuse the system by tampering with data contained in the system. Similar to the previous point is virus attack; viruses can compromise data contained in the system. Epileptic power supply and poor networking within the institution or organization can definitely limit the application of every computer-based system, including the proposed system.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

A schedule or a timetable, as a basic time-management tool, consists of a list of times at which possible tasks, events, or actions are intended to take place, or of a sequence of events in the chronological order in which such things are intended to take place.

Indeed, an information system will aid the users by providing them with information, helping them to organize it, store it and further communicate it to their fellow users, the viewers or the public; the public or users can equally communicate with the admin using the same medium in order to report any form of error in scheduling of events; this will help in decision making by the admin, and by so doing the system will be enhanced. The process of creating a schedule - deciding how to order these tasks and how to commit resources between the varieties of possible tasks - is called scheduling, and a person responsible for making a particular schedule may be called a scheduler.

However, the system is bound to face a lot of challenges. First, unverified information can be submitted to the system by evil-minded individuals. In addition, the initial cost (upfront cost) of setting up the system (such as cost of computer hardware, software and human-ware) is usually alarmingly costly. Furthermore, illiterate citizens might find it difficult to use the system; this will limit its application in effect. Intruders, including hackers and network eavesdroppers can mar or abuse the system by tampering with data contained in the system. Similar to the previous point is virus attack; viruses can compromise data contained in the

system. Erratic power supply and poor Internet connection definitely limit the application of every computer-based system, including the proposed system.

5.2 Conclusion

Given the enormous advantages of the proposed computer based time table information system, the researcher concludes that the system, when implemented, will assist the various institutions in Nigeria that uses time table by providing them with useful time table slots to help them manage the time they setup for an event or schedule. However, the researcher believes that issues such as tampering and abuse of data and information abound in the system.

5.3 Recommendations

The government and the institution in mention should adopt the computerized time table information system and implement it for all their time table or scheduling processes, likewise other institutions and organizations that make use of time scheduling. This will go a long way in helping to combat time table clashing of events and miss-management of time in Nigeria institutions. Moreover, administrators of the system should be properly trained to use the system well while the general public or users of the system should be given proper sensitization on the mode of operation of the system. Furthermore, government should intervene in the areas of power supply and any other tool that might cause limitation to the system in mention for smooth implementation of the system.

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