Indira Gandhi National Open University
School of Computer and Information Sciences

MCS-044
MINI PROJECT

Problem Definitions for July 2018 & January 2019

Important Notes
1. **Viva-voce of this project is compulsory.**
2. **Please follow MCS-044 guidelines for process of solving project problem and for the presentation format for submission of mini project report.**
3. **Please do not attempt the problems given in the course material of MCS-044, Block -1 or any other old problems. You must attempt one of the problems given in this section, if you submit mini project during July, 2018 or January, 2019 session.**

INTRODUCTION

The mini project is designed to help you develop practical ability and knowledge about practical tools/techniques in order to solve real life problems related to the industry, academic institutions and computer science research. The course Mini Project is one that involves practical work for understanding and solving problems in the field of computing. In this booklet the list of the problem definitions for the July, 2018 and January, 2019 sessions are given. Every year, the list of problem definitions will change. **Please do not attempt the problems given in the booklet (MCS-044, Block-1) received by you along with your course material.**

PROBLEM DEFINITIONS

We have divided different projects into four broad areas / categories of computer science as given below, so that you can select any one of these categories for your Mini project.

- Application development
- Networking project
- System software
- Website development.

An initial list of project definition will be given below in the following sections. However, student can elaborate the project definitions after discussing it with the project counsellor. Students should **select one project from the given categories only** as per their interest, experience and knowledge in that area. Students should evaluate themselves and then should choose the project. Students may propose modifications/suggestions in the given project specification and finalize it in consultation with the MCS-044 counsellor.

APPLICATION DEVELOPMENT PROJECTS

Here we focus on investigating ideas in application development through different projects. A set of possible project name and their details will be presented, however, students are encouraged to be creative and develop their own ideas in the given project descriptions.

1) **Project Name: On-demand examination**
   Description

   A University wants to create a Question Banking system for various examinations. It has about 500 subjects in which it proposes to make question bank. Each subject has an associated Question paper template which is modified every year. The template defines the number of questions, difficulty level of questions, and types of questions that are to be selected from each sub-topic of a subject. Every semester four question papers are generated with the help of the question bank. The question bank must have large number of questions for every sub-topic at different difficulty levels. A question that has been used at least twice is discarded from the question bank and new question is generated instead. A question can be input to a question bank only if it is duly verified by a moderator who also fixes the difficulty level of the question. There are only few users for this software mainly - the question bank updating person and the person who prints the question papers from the question bank.

   Analyse the system requirements and do good system design. Use suitable data structure/database to create this system. You may add more functionality into the system.

2) **Project Name: Book stock and Printing of books**
   Description

   A University sends books directly to its students, These books are printed by the University for various subjects. Every year students take admission to different programmes. Every programme consists of a number of subjects. **One subject may be part of many different programmes**. Printing of books is done at the University press and requires printing paper. You need not keep track of paper stock. The University predicts the number of enrolment of students based on last year data and Prints books before the students take admission to the University. You need to develop a computer based MIS that keeps track of books in stock and books that are to be printed. You may please note that University must not print excess books as it may lock up inventory unduly, also it require space. In addition, some books may be revised which will result in obsolescence of current stock. This MIS system should be able to predict the future printing requirements. You must do proper analysis of the requirements and do a good design. Use suitable data structure/database to create this system. You may add more functionality into the system.

NETWORKING PROJECTS

We will focus on simulating some of the basic protocols on 8-10 nodes to make networking project. Two of the possible project topics are presented here, however, students are encouraged to be creative and develop their own ideas in the given project domains.

1) **Project Name: Simulation of Slotted ALOHA protocol**
   Description

   Slotted ALOHA is a protocol that enhances the efficiency of ALOHA. You need to simulate Slotted ALOHA protocol. You may use random number generators to create load and also identify transmission requirements of packets. Also find the

throughput and transmission of frames for random nodes. You may assume 4-8 nodes for this simulation.

2) **Project Name: Simulation of Hierarchical Routing Algorithm**
   Description
   Assume that a network contains three hierarchical Regions with 3-4 nodes in each, simulate the hierarchical routing algorithm from one node to all other nodes of the network. You may refer to any Computer Network book for details on the protocol.

SYSTEM SOFTWARE DEVELOPMENT PROJECTS

Here we will focus on implementing some of the basic system software application. Two of the possible projects and their details are given here, however you are encouraged to be creative and develop your own ideas in the given project domains.

1) **Project Name: Creating a library Utility for File Comparison**
   Description
   Create a library utility preferably using UNIX, that accepts two input text files and compares their sentences. The utility should have functions that should identify all the sentences of the files, stores them into an array and then compares the sentences. You must also create logic for declaring two sentences identical, even though they may differ slightly. The identical sentences must be stored in a separate array and should be traceable to the original file. You must use an object oriented programming language for implementing this project.

2) **Project Name: Implementation Concurrency Related Problems**
   Description
   Assume that there is a shared buffer area of size 5 blocks with each block size of 64 bits. This area is to be shared among 10 producers and 10 consumers processes. The producer process generates a maximum of 64 bits data at a time and puts in the buffer. Any of the consumer may then use and delete this (maximum 64 bits) data from the buffer. Any of these processes may get activated randomly. Any producer process while generating the data must lock an empty buffer and fill data in it. A consumer processes can lock a data block if it is filled up by a producer and producer has unlocked it and no other consumer has already locked that data block. You also need to design and implement the necessary locking protocols that ensures the correctness of the use and updates of data blocks by several concurrent producer and consumer processes. Write a program using semaphores that ensures proper operation of producers and consumer processes. You should also make sure that no process starves for a long time. You may make suitable assumptions for the implementation. You may use any programming language for this implementation.

WEB DEVELOPMENT PROJECTS

Here, we will focus on investigating new ideas in application development through different projects. A set of possible project name and their details will be presented, however, students are encouraged to be creative and develop their own ideas in the given project descriptions.

1) **Project Name: Online Maintenance Management System**
   Description
   A company provide Maintenance Services to its customers on different household electrical and electronics products such as TV, Washing Machine, Refrigerator, Air Conditioners, Air Coolers, Microwave Ovens etc. The company takes maintenance contract for various households and industry clients. They maintain all the information about these products including make, date of purchase, serial number of machine, original cost of the machine etc. The company performs two kinds of maintenance services - preventive maintenance which are done periodically once in every quarter and fault repair - this maintenance is done whenever a call is made by the client. Company maintains the details of both these types of services including visiting engineer details, name of part replaced and date of maintenance. Company charges for replacement of parts. It also provides a two month warranty of replaced parts. Analyse the requirements in details and design & develop the online system for the appointments. You may visit some service centre and may study the problem domain.

2) **Project Name: Online Locker Management System**
   Description
   A Bank branches maintains a number of different types of safe lockers at some of its safe sites. On the request of its customers bank issues a locker to a customer who has an account with the bank. A locker can be held jointly by two or more customers also. Bank charges yearly rent on the locker from the customer which is directly deducted from the account of the customer. For operating a locker, a customer can give a request through the website specifying date and time of operation. The bank confirms the appointment and on the stipulated date and time allows operation of the locker. Bank allows only a maximum of 12 free operations of the locker in a year, subsequently it charges for the service from the customer. Bank also has a process for allocation and cancellation of a lockers. In general as the number of lockers are limited, therefore, bank maintains a queue of customer who have requested for the locker service. Study various requirements for such a system from an actual bank. Analyse the requirements in details and design & develop the online system.

GUIDELINES

The MCS-044 block covers the majority of the guidelines regarding the formulation of the project proposal, formulation of the project report and the format to the followed for the project report. However the following are the detailed guidelines with respect to the counseling sessions and evaluation scheme.

Practical Counseling sessions

Students can discuss their topic with the counsellors at study centres and the counsellors will give suggestions on project specification at the study centre during the practical sessions. There are total 10 practical sessions, as given below:

Name of the Topic	No. of Practical Sessions (3 hrs each)
Project specification	1

Coding / Implementation	5
Testing	2
Documentation	2

Role of the Counsellor

The MCS-044 Mini-project counsellor is the person who motivates and helps students during the development of the project. The counsellor should take responsibility for guiding and approving different project processes, including Analysis, Design, Coding, Testing, and also the editing of project reports. Moreover, the main responsibilities of a counsellor are:

- Dedicating adequate time to the student for providing effective supervision and encouragement,

- Making sure that the student chooses a manageable project topic,

- Providing critical comments on the student's work and progress,

- Ensuring the student has access to necessary data,

- Encouraging the student to proceed in the intended direction and to agreed time limits, and

- Making sure that the project is the student's own work.

PROJECT SUBMISSION

Project Proposal

Project proposal should be presented to, reviewed by and agreed upon in consultation with the project counsellor to provide constructive feedback on the proposal and planned programme of the project work. **No need of any formal approval to be taken on any proforma**.

Project Report

The project report will contribute to the assessment and your marks. The format of this report will follow the format, guidelines and suggestions given in the block, but details should also be discussed with your counsellor. The final reports of students doing **the project in a group should not be identical. Each student should emphasise on his/her role and responsibilities in the project work.**

Submission of the Project Report

One copy of the original project report is to be submitted to the Study Centre concerned. A photocopy of the same project report must be retained by the student and should carry with him/her at the time of the viva voce.

EVALUATION SCHEME

MCS-044 course has three main evaluation components consisting of assignment (25 marks), project report (50 marks) and viva-voce (25marks). **A student is required to score 40% marks in each of these components separately for successful completion of the course.**

The project will be assessed by a written report and a combined presentation and viva voce (viva voce). To help the students we have given some guidelines about evaluation and assessment in the next section. If, the examiner finds that the project is lacking in any key areas then, the student will be asked to re-submit the project by selecting a new topic in the next session.

Resubmission of the project by the failed students

If the student fails in project report evaluation or viva-voce or in both, the students need to redo the entire process by selecting a new problem from the list of problems which will be updated every year.

Assignment/Continuous Evaluation

25% of total marks are allotted to assignment/continuous evaluation. The assignment questions are given in the MCA 4th semester assignment booklet.

If the student failed only in assignment component and successfully passed in project report evaluation and viva-voce, s/he needs to submit the fresh assignment of the current year, as is done in the normal courses.

Final Evaluation

The Term End Practical Examination of Mini Project will be conducted at the study centre concerned. 75% of total marks are evaluated in the final evaluation. Out of these 75 marks, 50 marks are allotted for the project report evaluation and 25 marks are allotted for viva voce.