THE ICT UNIVERSITY

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGIES

FALL 2023

COURSE TITLE	DESIGN AND MODELLING
COURSE CODE	SE 3140
PURPOSE	Final Examination
INSTRUCTOR	Mr. Mangong Clement Fosah
TIME	2 Hours

INSTRUCTIONS:

This paper has a problem description. All the questions are compulsory.

The ICT University, ~~Yaounde~~Yaoundé C~~c~~ampus is located at Messassi, some Kilo meters from the main town. In response to resolving distant problem, the institution management decided to make provision for a school bus wherein, such students living across town could make use of the service. Parents who wish their children to benefit from this service had to pay a token for the bus service per semester.

In implementing the service during the first time and traditionally, there were several challenges faced. These include information flow, student payment follow up, location of the bus, departure time and the various bus stop and timing.

Suppose you are given the task to model, design and develop software to manage the bus service. The brief description of the anticipated software is as follows.

Service subscription

At the beginning of each semester, students subscribe for the bus service. Payment of the service could be in two instalments and paid at the finance department of the university. After payment, a receipt is issued to the subscriber (student or the student parent). The receipt has a receipt number, subscriber name, number, payment amount, instalment, mode of payment (online pay, cash, bonus, compensation, scholarship) and optionally a transaction code. The receipt information is recorded in the system by the finance clerk. Only students are allowed to subscribe for the service. Students are identified by their name, school registration number, telephone number, address, and parent or guardian telephone number.

Bus Localization

A**s** the service goes operational, a bus is driven by a driver and controlled by a conductor. The conductor also acts as the security and entry controller. The Bus driver is identified by a name, address, telephone number and driving license. The driving license is characterized the license number, expire date and category. Payment of insurance of the bus and fuelling is managed by the finance though requested by the driver. The bus is identified by the colour, number of seats, registration number, horse power and the fuel type. The bus does three trips to carry student to school and equally does three trips to leave the students at their destination points. The bus only stops at precise bus stops. Though traffic congestion may make the bus to arrive a bus stop late or arrive at a bus stop late, a bus can only stay 5 minutes at a bus stop before kick-off except the school stop. A bus stop is identified by a name, address, and number. Student is to wait in any of the bus stops. Bus has a device that students can use their user application to track the location of the bus. The bus leaving school at an instant will be analyse using a particular algorithm to have the percentage of student who have indicated ready to go back home.

1. Give the stakeholders you will meet to gather requirements for project. (Justify your choice or identification) 4mks
2. For each stakeholder, give the technique of gathering of information you will use and justify your choice of technique. 4mks
3. Considering your analysis of the problem domain
   3.1.Model and design the UML use case diagram of your solution. 5mks

3.2.Write the use case description of the use case above. 5mks

3.3. Design the UML Activity diagram of your solution. 5mks

3.4.Design the UML class diagram of your solution. 7marks

3.5.Using the object and class structuring criteria, classify your classes and objects under the suitable Entity, Boundary, Device I/O, control and application logic classes. 5mks

3.6.Choose one use cases and design the communication diagram of the system. 2 mks

3.7.For the use cases chosen above, design the sequence diagram of the system. 1 mks

3.8.Choose one state-dependent object and draw the finite state machine of the object. 2 mks