PROGRAMMING COMPETITION 2025
CASE STUDY PROJECT FOR TERTIARY INSTITUTIONS
19 – 28 SEPT 2025

PROJECT TITLE: MEDICAL EXPERT SYSTEM FOR MALARIA AND TYPHOD FEVER (MESMTF) FOR MINISTRY OF HEALTH AND SOCIAL SERVICES

A Medical Expert System (ES) is a computer program that uses artificial intelligence to emulate human expertise, aiding in tasks like diagnosis, treatment planning, and patient care. By so doing, ES acts in all respects like a human expert, using human knowledge to solve problems that would require human intelligence. When patients seek the help of medical experts, they do so for diagnosis and treatment of their various health problems. You are required to develop a fully-fledged web-based M̲edical E̲xpert S̲ystem for M̲alaria and T̲yphoid F̲ever (**MESMTF**). The system is expected to provide e-Health services for medical records, appointment, diagnosis, treatment, pharmacy, drug administration and reporting at the Ministry of Health and Social Services. Teams are expected to go online or make more enquiries and establish additional requirements for **MESMTF**, where necessary. *Use of online AI tools for automatic program/code generation, such as ChatGPT, etc, is not permitted.*

The following specifications/interfaces are assumed, but may be complemented by other requirements discovered by your team: Medical Records, Appointment with the Doctor, Diagnosis, Treatment, Pharmacy, Drug Administration, and Reporting. *You are to develop sets of production rules for Malaria and Typhoid fever, and use them for the diagnosis module.*

Table 1 shows some of the signs and symptoms of Malaria/Typhoid Fever.

Signs	Malaria Symptoms	Typhoid Symptoms
Very Strong Signs (VSs)	Abdominal pain, Vomiting sore throat	Abdominal pain, Stomach issues
Strong signs (Ss)	Headache, Fatigue, Cough Constipation	Headache, Persistent high fever
Weak signs (Ws)	Chest pain, Back pain, Muscle Pain	Weakness, Tiredness
Very Weak Signs (VWs)	Diarrhea, sweating, rash Loss of appetite	Rash, Loss of appetite

Very strong signs (VSs) of Malaria and Typhoid will require chest X-ray, in addition to the drug administration. Other signs such as Strong signs (Ss), Weak signs (Ws) and Very Weak Signs (VWs) will require drug administration only (no chest X-ray). It is the responsibility of teams to search for the name of drugs that can be used (administered) for the treatment of Malaria and/or Typhoid. Note that the drugs for the treatment of Malaria maybe be different from the treatment of Typhoid Fever.

Teams should verify/establish the symptoms and treatment drugs for Malaria; Typhoid Fever; and Malaria and Typhoid Fever combined. The Medical records module and Pharmacy module is an information system integrated into the **MESMTF** system.

There should be a screen to enter the different symptoms for Malaria and Typhoid. The **MESMTF** system should be dynamic and allow for entering symptoms of other diseases such as Tuberculosis (TB), HIV/AIDS, Mental Health, Diabetes, etc. Teams should be able to demonstrate the ability of the **MESMTF** to handle the diagnosis of some other diseases.

The **MESMTF** system should be able to handle online access (where there is internet connectivity) and offline access (where there is no internet connectivity).

Apart from the basic requirements described above, participants are encouraged to be as innovative as possible, for example, adding a chatbot feature for the website or allowing users to blog and others to comment or like. Such additions are not basic requirements, but may earn your team some additional points under creativity. For a detailed assessment rubric, see page 5. Page 6 gives the documentation template.

Metadata you may use/add to your website
Name of Organisation: Ministry of Health and Social Services

Assumed Existing E-Health System
The existing system is assumed to be manual and have the following medical services done conventionally: Medical Records, Appointment with the Doctor, Diagnosis, Treatment, Pharmacy, Drug Administration and Reporting.

The proposed system

In the new system, an **MESMTF** is proposed to handle Medical Records, Appointment with the Doctor, Diagnosis, Treatment, Pharmacy, Drug Administration and Reporting.

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Requirement Specification
This states the functional and non-functional requirements of the proposed **MESMTF**. The Functional requirements are labelled FR-x. Where FR stands for functional requirements and x is a unique identifying integer. The Non-Functional requirements are labelled NFR-x. Where NFR stands for non-functional requirements and x is a unique identifying integer.

Functional Requirements
Functional requirements are the list of services that the system should provide, how the system should behave in a given situation and how the system should react to specific inputs. The functional requirements for the system include; users registration (users includes patient, doctor, nurse, pharmacist, admin, etc), managing of users' accounts by the admin, and many more. Moreso, registration of patients, storing their details into the system, and also booking their appointments with doctors. The software must have the facility to give a unique id for every patient and stores the details of every patient and the staff automatically. User can search availability of a doctor and the details of a patient using the id. The **MESMTF** can be entered using a username and password. Part of the administrator's tasks includes managing doctors information and patient's information and checking appointments a n d prescription.

Table 2: **MESMTF** Functional Requirements

FR-X	MESMTF FUNCTIONAL REQUIREMENTS:
FR-1	User registers on the system (users includes medical receptionist, patient, doctor, nurse, pharmacist, admin, etc)
FR-3	The user is prompted to enter username and password for authentication after the sign in option is clicked.
FR-4	A dashboard page is displayed to the user (patient, doctor, nurse, pharmacist) after validation, with the following options: Medical Records, Appointment Booking with the Doctor, Diagnosis, Treatment, Pharmacy, Drug Administration, Reporting, Search and Logout.
FR-5	The system has the ability to search for doctors, drugs, etc.
FR-6	The user can log out of the system anytime using the logout option.
FR-7	A dashboard page is displayed to the user (administrator) after validation with the following options: Medical Records, Appointment Booking with the Doctor, Diagnosis, Treatment, Pharmacy, Drug Administration, Reporting, Search and Logout.

The system is a web-based system or a hybrid of web-based and mobile-based. The users can access the system through the web user interface (WUI) using devices like PCs, laptops and smart devices (phones, tablets, etc). Every user will have to register on the system through the web user interface (WUI) so that a user's profile will be created which will be used by the system. Once a user's login details have been validated at the point of access, the user will then gain access to the services of the **MESMTF** system.

NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements are constraints on the services or functions offered by the system such as timing constraints, constraints on the development process, standards, etc.

Table 3: **MESMTF** Non-Functional Requirements

NFR-X	MESMTF NON-FUNCTIONAL REQUIREMENTS:
NFR-1	**Availability/Accessibility** - The system should be available on a web, or web with mobile. The system should be accessed using a desktop computer or laptop or mobile devices
NFR-2	**Security** - The system should be able to authenticate users by requesting for their username and password before granting them access to the services.
NFR-3	**Capacity and Scalability** - The system should be able to accommodate a large number of patients at the same time.

Table 4: Module and Requirements Supported by **MESMTF**

Module ID	Module of the MESMTF	Requirements Supported
M-ID1	Registration/ Sign up	Register/Sign up users (users includes medical receptionist, patient, doctor, nurse, pharmacist, admin, etc). Each user will enter his/her profile/details during Registration/Sign up. Each user shall have a module with different access permission.
M-ID2	Login	Registered users only (users includes medical receptionist, patient, doctor, nurse, pharmacist, admin, etc). Each login screen should show different menu items based on access permissions. For instance, the login screen for medical receptionist should show different menu items. Same for patient, doctor, nurse, pharmacist, admin, etc.
M-ID3	Medical Records	View patients. Authorised users should be to Upload/Edit/Delete/View/Search for patients.
M-ID4	Appointment booking with the Doctor	Patients can search for doctors and book appointment, or modify appointment or cancel appointment
M-ID5	Diagnosis	Doctors can use the system for medical diagnosis
M-ID6	Treatment	The system should provide the treatment services
M-ID7	Pharmacy	The system should provide pharmaceutical services
M-ID8	Drug Administration	The system should provide drug administration services.
M-ID9	Reporting	The system should provide reporting services, such as, printing of prescriptions, etc.
M-ID10	Databases	Backend database should be provided. Add/Edit/Delete/View permission for all interfaces, if the user is an administrator.

Additional Information of MESMTF

In addition to the above functionalities, the Diagnosis module **(AI-Doctor)** should use a rule-based Expert System that allows individual/anyone at any time, any place (home, school, office, on the move, etc), to carry out personal diagnosis of Malaria and Typhoid Fever by entering any/some symptoms in Table 1 above, and thereafter establish if he/she is having Malaria or Typhoid Fever. However, such individual, if the system says he/she has Malaria or Typhoid Fever, will have to book appointment with a doctor**. During appointment booking, the available expert medical doctor in the field of Malaria and Typhoid fever is __recommended__ to the patient**. Thereafter, the patient will physically visit the medical centre on the appointment date to see the doctor for confirmation of the diagnosis, proper treatment and drug administration.

Notes to Participants / Rules for the Competition

The above are sample content that should be included on the website. However, other innovative concepts on the website are welcomed. The website must be dynamic and allows administrative access by a medical staff. It must have a backend database.

TWO METHODS OF SUBMITTING PROJECT FILES/FOLDERS INCLUDES: GITHUB AND GOOGLE DRIVE

(1) Team should upload their files/folders on Github and also google drive.
(2) The following steps show how to upload your project files or folder on Google drive:
- Log into your gmail account, Enter this URL:https://drive.google.com/drive/my-drive and click on New.
- Select File upload to upload a file or Folder upload to upload a folder.
- Right click on the File or Folder that you have uploaded. (If the file/folder is too large, Zip into a single file).
- Select Share to share the Folder or Zip file with the prg team, enter this email: prg.competition@gmail.com
- Click Done.

DATE OF SUBMISSION OF THE PROJECT CODES AND MS WORD DOCUMENTATION: SAT 27TH SEPT 2025 BY 7AM LATEST

PROGRAMMING COMPETITION 2025-SCORESHEET/RUBRIC FOR TERTIARY INSTITUTIONS.

Criteria	Implementation Level					Highest Mark	Mark Earned
Functionality	Participants failed to understand the task and only did menial features [0 Mark]	Only a few features are done correctly but below average [2Mark]	At least half the functions are fully developed and demonstrated [4Marks]	A good attempt where most functionality are properly done and only missed a few [6 Marks]	Managing to develop all basic features given in the competition document [10 Marks]	10	
Logic and correctness (Code and planning)	No logic and incorrect ness in the logic displayed [0 Mark]	Incomplete logic and solution partially correct [2 Mark]	ad hoc solution; program "designed at the keyboard" but correct [5 Marks]	Logic partially planned out [10 Marks]	Logic well thought out and planned as per requirements [15 Marks]	15	
Creativity	No new feature added apart from the basic requirements [0 Mark]	Below Average [2 Mark]	An acceptable level of innovativeness shown [4Marks]	Above average [6Marks]	Showing a high degree of innovativeness by adding exceptional features [10 Marks]	10	
Programming Style	No clear distint style in code and difficult to read [0 Mark]	Below average [2 Mark]	Lacked consistency in styling and commenting code [4 Mark]	Above average [6 Mark]	Readable code with clear comments, good indentation [15 Mark]	15	
Presentation	Presented by a few group members, lacked confidence, failed to answer questions [0 Mark]	Some components of the presentation done below average [5 Marks]	Some questions not properly answered despite displaying good team work and confidence [10 Mark]	Some components of the presentation done above average [15 Mark]	Team work displayed, confidence in presenting, and accurately respond to questions [20 Marks]	20	
Problem Understanding (Flowcharts and/or pseudocodes)	No understanding of problem/ specification [0 Mark]	Problem transformed and diverted from initial idea [4 Mark]	Partial understanding and transformed / simplified [6 Mark]	Most relevant components of problem well thought out [8 Marks]	All Problem components well analyzed and completely understood [10 Mark]	10	
Comments and Documentation	No comments at all [0 Mark]	Few random comments, not documentation formatted [4Mark]	Wordy, unnecessary, incorrect, or badly formatted comments [6 Mark]	Partial, well written or formatted comments and documentation style [8 Mark]	Concise, meaningful, well- formatted comments and professional documentation [10 Marks]	10	
Deployment	No deployment or plan to deploy [0 Mark]	System running as standalone components and not ready for deployment [4 Mark]	System only deployed on local machine [4 Mark]	System deployed locally but with complete plans to deploy [8 Mark]	System deployed on cloud/web platforms or distribution platforms or run live on test server [10 Marks]	10	
						Total Mark (100)	

Document Submission Template in MS Word format

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GROUP MEMBERS:

Sn	Name	Name of institution	Role played in the project
1	Daniel Yuyu (TL)	xxx	I participated in the coding of web service and the backend.
2	Ralph Dada	yyy	I wrote the test codes for almost every component.
3	Mutelembi Sisi	zzz	I was responsible for developing the entire frontend.
4	Tengeevandu Mimi	bbb	I supported the Team Leader in the documentation of the software

TL=Team Leader

DATE OF SUBMISSION:

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