# 3.2 Hardware Interfaces

Since the system is an interactive educational website operating entirely online, it does not require dedicated hardware installation on the client side.

Users can access the platform through any device equipped with a modern web browser and a stable internet connection.

**Client Side**:

The platform can be accessed by students, teachers, and parents using:

Desktop or laptop computers

Smartphones or tablets

**Recommended minimum specifications**:

* RAM: 4 GB or higher
* Web Browser: Latest version of Google Chrome, Microsoft Edge, or Firefox
* Internet Connection: Stable and high-speed broadband or fiber connection

**Server Side**:

The hosting server should meet the following minimum requirements to ensure smooth and efficient operation:

* Processor (CPU): Quad-core or higher
* RAM: At least 32 GB
* Storage: Minimum of 200 GB of free disk space
* Internet: Continuous high-speed connection for uninterrupted service

# 3.3 Software Interfaces

The *Qema* E-Learning System is built using modern web technologies to provide an interactive, secure, and scalable learning environment.

**Operating Environment**:

The system runs on any operating system that supports a modern web browser (Windows, macOS, Linux, Android, iOS).

**Technologies Used**:

Refer to section 2.4 Operating Environment.

**Integrated Services**:

* Google Meet API for hosting live online classes
* Email API for sending notifications and alerts
* AI Chatbot for student support and interactive communication
* Gamification System (coins and rewards) to enhance engagement and motivation

# 3.4 Communications Interfaces

As an online platform, continuous and secure internet communication is essential for the system’s operation.

**Communication Methods within the System**:

* Secure HTTPS communication between the client browser and the web server to protect user data.
* Automated email notifications sent to users for registration, exam results, and other important updates.
* AI-based chat support for real-time assistance and guidance.
* Integration with Google Meet for live and interactive virtual classes.
* Real-time data synchronization between the server and users to ensure instant updates of lessons, grades, and progress.

**Requirements**:

* A stable and high-speed internet connection for all users.
* A secure web server with an active SSL certificate.
* The server should handle a large number of concurrent users without performance degradation.