# 

KEA\_STUD CHAT MESSENGER

Solution description and baseline cost

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# Document information

## Document version

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| --- | --- | --- |
| Version | Author e-mail | Description |
| 1.0 | Nikolaj B. Hemmeshøj, [nibh@kea.dk](mailto:nibh@kea.dk)  Head of Enterprise Architecture | Initial draft |
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## Confidentiality Rating

|  |  |
| --- | --- |
| Rating |  |
| Company Confidential | X |
| Non Confidential |  |

# General

KEA\_STUD Chat messenger will provide with the possibility of chat within an institute. It will provide the user with the facility to communicate in-group or private, to exchange small/medium files during conversation, save the chat history. The chat system will work using Local Area Network (LAN).



Fig-1

## Solution summary

KEA\_STUD LAN chat messenger will provide ease to users in terms of connection, as it will enable users inside the organisations firewall to connect and communicate to each other using existing resources without being connected to Internet. The communication will be platform independent. Moreover it will reduce the cost of communication (by minimising mobile/text usage) and also the maintenance costs. No centralised server or active internet connection is required for communication.

## Deliverables summary

KEA\_CHAT LAN messenger will deliver following results that can be measured afterwards:

* User Login & Signup options.
* Internet less connection between users.
* Facility to send group and private messages.
* Ability to exchange files during conversation.
* Option to save message history for future referral.
* Ease of communication between KEA students and staff.
* Setup manual

1. How to install server
2. How to setup Database
3. How to get the system going and maintaining

## Cost summary

High level cost elements that the project will carry once implemented or will be running:

* Software development hours in case of further extension of the software.
* Maintenance cost in case of system breakdown.

The initial development of KEA\_STUD LAN chat messenger didn’t incur any cost because we utilised already available resources and open source software. High-level cost elements that the project will not carry as it can use existing architecture.

* The Server can run on any existing machines so it saves the hosting costs.
* Open source software were used for development so no licence costs.
* Operation cost as it can be set up using existing resources form KEA and does not require any additional equipment.

# Recommendation and next steps

KEA\_STUD LAN chat messenger can be implemented by using one dedicated machine, which runs the Server. Further improvements can be done to implement the centralized Database Management System too which couldn’t be done now due to shortage of time. The system will help in communicating people during university hours as all the users within the campus can interact with each other without using Internet/Phone calls. The online students can help each other instantly. And administration or teachers can respond to student queries quicker.

Although the private chat option is already available but still the privacy can be improved and an administrator can be assigned for authorizing and assigning access privileges to particular users in specific chat groups. Furthermore the other features like voice/video call can be implemented for enhanced user experience.

As the load increases more servers and load balancer can be added to handle it without compromising user experience.

# Detailed solution description

Normally when a student or a staff member at KEA needs to talk to each other, within campus they call the other person but this acquires costs or if you leave an email then you need to wait for the reply and sometimes it can take up to day or two to get the reply which wastes lots of time and delays things. So in this way our KEA\_STUD LAN chat messenger provides solution to various communication problems within the institute and save resources like time.

The strength of the system lies in enabling users to communicate without having an internet access. The system allows the users to save their chat histories and also allow them to exchange the files when required hence no need to hassle about composing a separate e-mail with attachment to transfer the file. KEA\_STUD LAN chat messenger supports centralized server mode. The user information and the history will be saved in MySQL database, which makes system more optimized and secure as compared to traditional file system.

## Technical dictionary

## Here is the brief explanation of few terms that have been used in the text:

**Socket:** A socket is an object that represents the low level access to the IP stack. A socket is a simulated medium that allows sending and receiving of data in an application.

**LAN:** A **local area network** (**LAN**) is a computer network that interconnects computers within a limited area such as a home, school, computer laboratory, or office building, using network media.

**MVC:** Model–view–controller (MVC) is a software architectural pattern for implementing user interfaces. It divides a given software application into three interconnected parts, so as to separate internal representations of information from the ways that information is presented to or accepted from the user.

**Load Balancer**: A load balancer is a device that acts as a reverse proxy and distributes network or application traffic across a number of servers. Load balancers are used to increase capacity (concurrent users) and reliability of applications.

**Server Farm:** A server farm is a collection of computer servers usually maintained by an enterprise to accomplish server needs far beyond the capability of one machine.

## Architecture overview

KEA\_STUD LAN chat messenger is based on Model View Controller (MVC) architecture in order to make further extension of application easy and making code reusable. The processing and logic part has been kept separate from the graphical user interface and controllers. The application handling for database queries is implemented separated while the user interface presentation or the logic processing is implemented separately. The whole application is divided into further sub applications i.e. client side app and server app. The client application runs on the users computer and the server can run on any computer on network. To send/receive the message the user should be connected to the server. The user can broadcast the message to all the users online (Public Chat) or can send it to any particular user (Private Chat).

The application is developed using Object Oriented Programming in Java Language. To establish the communication link between the systems on the network we need socket connections. A socket enables the application/users to connect to the network and communicate with other applications/users connected to the same network. On a particular machine the socket is composed of an IP address and a port number.

As mentioned above there will be two applications for client and server, so two sockets are made the client application will execute the client socket while the server application will run server socket. To connect to the server socket client requires its IP and the port number. The client and server need to share the same port number in order to achieve the connection. Moreover they need to agree upon the protocol used that could be TCP, UDP or RAW. In our case it will use TCP/IP protocol for connection.

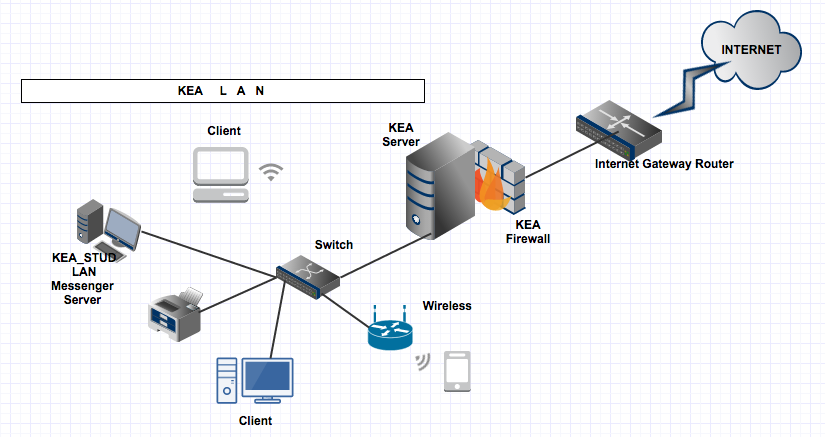


Fig-2

## Server setup

Many computers on the network have capability to run the server side of the application while they are executing or running the other services. But it can always be executed on a dedicated workstation to handle the load in a better way. The client knows the IP address and the port of the system on which server is running. In IP networking context server is a program that listens for the socket requests. The client sends the connection request which server accepts. And hence a communication link between client and server is established.

If the number of users will increase the additional servers can be added in the architecture, the load balancing can be implemented which can distribute the connection requests among the servers to handle the requests efficiently.



**Fig-3**

## Functional requirements

The KEA\_STUD LAN chat messenger will exhibit following functional requirements:

* Register User.
* Login to the System.
* Display list of online contacts.
* Communicate without Internet access.
* View the Online users and groups.
* View chat history.
* User can chat in a group.
* Save chat history.
* Send/Receive small-medium sized files.
* Notification on receiving new message.
* The system must display the notification on receiving reply/new message.

## Non-functional requirements

Here is the list of non-functional requirements that our system should meet:

|  |  |
| --- | --- |
| **Security** | * It is a secure LAN messenger. * The data is stored on MySQL database, which makes it, secure than traditional file system. * Doesn’t support Encryption. |
| **Reliability** | * It cannot accommodate the failure in case the server fails. But the server can be restarted to make it work. * The system should be up and working 95% of the time. |
| **Usability** | * It has user-friendly graphical interface. * It supports English language. |
| **Supportability** | * The complete operation document and installation manual will be provided for the customer support. |
| **Performance** | * The system performs well and the normal response time is less than a second. Even in peak hours the system should not take more 4-5s to response. |

## Capacity recommendations

Currently we will require only one machine to run server. When the database gets centralised, the database server can be implemented on the same machine. But theoretically assuming that with the passage of time the number of clients using the systems will increase and there comes a point when more than one machine could be required to run server. In that case the load-balancing device could be setup to distribute the traffic equally and let the application work optimally during the peak hours. Moreover having distributed server setup and load balancer will also increase the reliability of the application; as in case of server break down the user traffic could be directed to the running server in the server farm.

# Impact on other system

This system is not a part of any company or infrastructure so it will not have any impact on any other system or company yet. The resources used to implement the system are available within the institute so no external dependency will affect the internal setup or infrastructure.

# Failover and scalability

Scalability-The system has been developed in view to keep the option of further up gradation of client and server. Any component in the system like database or server etc can be upgraded later to accommodate the increased number of users. To prevent failover and keeping system up and running 95% of the year multiple servers will be working, so if one of the server will crash the other servers will be there to provide the service.

# Technical implementation plan

The system is built in Eclipse IDE for Java developers. Java development kit (jdk) is required to compile and run the program. The object oriented programming using java language is used to write the source code for the system. The database is implemented in MySQL.

## Solution implementation components

### Preparation

1. Understanding why system should be built.
2. Analysis of functional and non-functional requirements.
3. Define the scope of the project.
4. Create installation manuals.
5. Create feasibility plan.

### Development of software

1. Software design implementation.
2. Database designing.
3. Building algorithms to implement the design.
4. Writing the source code of the system.
5. System testing and removing bugs.

### Hardware setup

1. Install Servers
2. Install Eclipse IDE
3. Install jdk 1.5 or later
4. Install databases

# Cost

Initially the system will not cost anything as it has been built by using open source software. The Eclipse IDE is used for development and MySQL is used to implement database. And we will recommend using the future extension of the software, as these days many open source software are readily available with equally powerful features for developers and it will save lots of capital.

## Platform cost

For server implementation we can use one powerful stand-alone machine or various economical machines, which can set up in a server farm and resources can be accessed using load balancer, which distributes the user load and helps save money.

## License and support

All products used for the development of this application have either GPL or EPL open source license. Support will be available in the form of the user manual and operation documents. Moreover the system is not very complex and due to its GUI its easy to use. The network administrator already working in the organization can be equipped to provide support in case if unexpected issue arises.

## Operational Cost

Initial operational cost will be zero because we will be using existing resources. But as the number of active users will increase the multiple servers will be required to set up the database and the server. Cost can depend on the choice of machine and the number of active users.

Moreover the hardware purchased might not have an operating system, which can be purchased from price starting $1000-$4000 for an Enterprise edition Windows Server. Similarly a MySQL database server will cost $900 or so.

# Risks

When it comes to small to medium level development using limited time frame and resources there is always a possibility of the risks coming in your way when the application becomes operational. Keeping this fact in mind we have developed a proactive risk strategy to identify the risks and develop preventive measures against it.

The possible risks for the project have been identified and depending on the frequency of their occurrence they have been scaled up to 1-10 and at last a mitigation action and solution has been developed.

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| --- | --- | --- | --- | --- | --- |
| Item # | Area | Description | Rank | Mitigation | Solution |
| #1 | Technical | Server Breakdown | 4 | Monitor Server Load | Multiple Servers |
| #2 | Software | Run time error | 5-6 | JRE missing | Install JRE |
| #3 | Technical | Power Interruption | 2 | Sudden power failure | UPS installation |
| #4 | System | System fails under stress | 3-4 | Scaling up the system | Load balancer to distribute the users in server farm |