DBE - Distributed Systems

Project Proposal

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1 Introduction

We propose the design and implementation of a chat application using central and advanced principles of distributed systems development. The application should allow users to communicate via text messages. It should also be possible to communicate in group chats. The idea is that the users register themselves. The main server transmits the registered users as active. Afterwards the communication runs over the main server, which receives the messages and transmits them to the addressee. For the protection of the data further backup servers are installed, which get their information over the main server.

2 Project requirements analysis

2.1 Dynamic discovery

- Client registers itself by sending username to server
- Server receives various incoming client's requests
- It stores the information of the clients Ip address and name in a list
- This List is **broadcasted** to all the users
- Whenever a client logs out, it deletes that particular client entry from its list and updates it accordingly
- It also keeps track of various chat rooms, providing a group Ip to each multicast group

2.2 Crash-Fault-Tolerance

- The failure of a participant must not cause a crash of the entire system.
- In the failure case a new leader election should be triggered
- Heartbeat messages sent by the leader as a failure detector when a participant crash
- Backup server which replicates the data
- Vector clock to ensure synchronized time
- Concurrency and transparency

2.3 Voting

- Based on the LCR (LeLann-Chang-Roberts) Algorithms
- Every server must have a unique ID
- If one server goes down a new leader will be elected
- Clients can trigger election if the server does not respond
- After trigger neighbor will be searched and pinged
- Voting message will go around until a server get its UID back
- After election leader announces itself as a leader

3 Architecture design

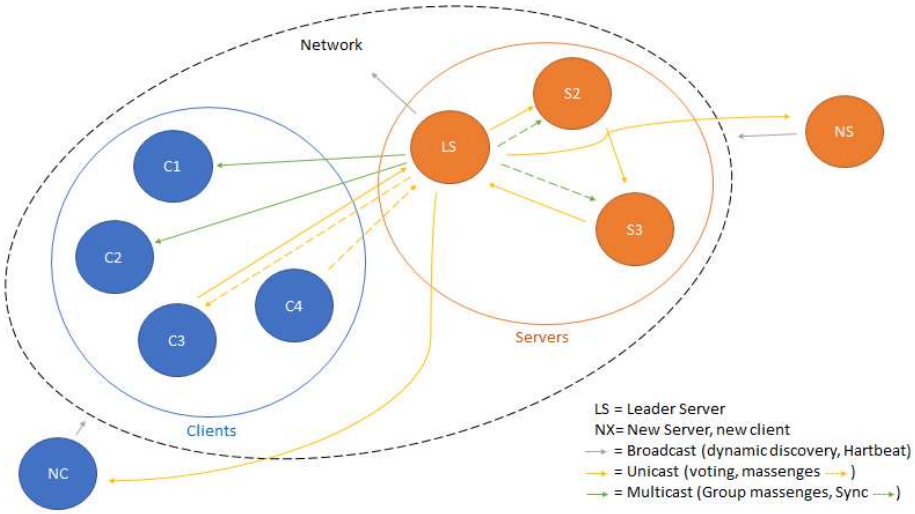

Fig. 1. Architecture design draft.

4 Implementation overview

We plan to write the whole project in Python 3 programming language. For the remotely collaborative work we will create a public repository in GitHub. Through this opportunity, each group member can contribute on their own project topic as they prefer, and we will have a version documentation. Therefore, any programming environment can be used. Until now, PyCharm and Visual Studio are used and connected to GitHub.

References

1. Aiello M..: Lecture notes Distributed Systems (Summer term 2022)

5 Template - to be deleted

5.1 A Subsection Sample

Please note that the first paragraph of a section or subsection is not indented. The first paragraphs that follows a table, figure, equation etc. does not have an indent, either.

Subsequent paragraphs, however, are indented.

Sample Heading (Third Level). Only two levels of headings should be numbered. Lower level headings remain unnumbered; they are formatted as run-in headings.

Sample Heading (Forth Level). The contribution should contain no more than four levels of headings. The following Table 1 gives a summary of all heading levels.

Table 1. Table captions should be placed above the tables.

Heading level	Example	Font size and style
Title (centered)	**Lecture Notes**	14 point, bold
1st-level heading	**1 Introduction**	12 point, bold
2nd-level heading	**2.1 Printing Area**	10 point, bold
3rd-level heading	**Run-in Heading in Bold.** Text follows	10 point, bold
4th-level heading	*Lowest Level Heading.* Text follows	10 point, italic

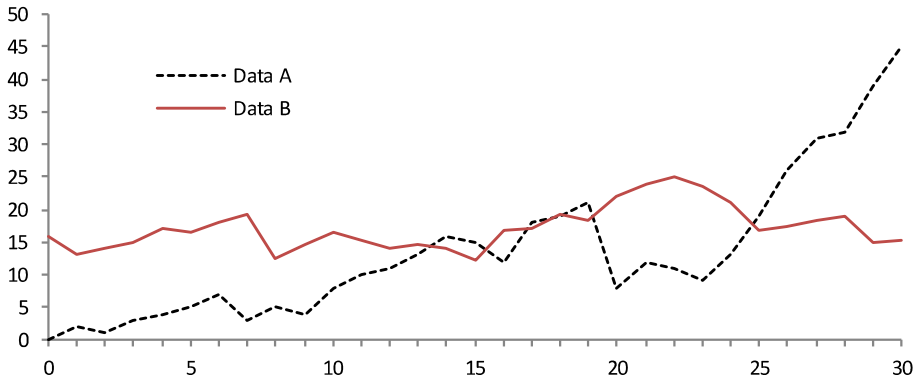

Fig. 2. A figure caption is always placed below the illustration. Short captions are centered, while long ones are justified. The macro button chooses the correct format automatically.

For citations of references, we prefer the use of square brackets and consecutive numbers. The following bibliography provides a sample reference list with entries for journal articles [1], an LNCS chapter [2], a book [3], proceedings without editors [4], as well as a URL [5].

References

2. Author, F.: Article title. Journal 2(5), 99–110 (2016).
3. Author, F., Author, S.: Title of a proceedings paper. In: Editor, F., Editor, S. (eds.) CONFERENCE 2016, LNCS, vol. 9999, pp. 1–13. Springer, Heidelberg (2016).
4. Author, F., Author, S., Author, T.: Book title. 2nd edn. Publisher, Location (1999).
5. Author, F.: Contribution title. In: 9th International Proceedings on Proceedings, pp. 1–2. Publisher, Location (2010).
6. LNCS Homepage, http://www.springer.com/lncs, last accessed 2016/11/21.