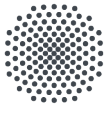

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Distributed Systems

Overview and student projects

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2020
Summer

What to expect?

- Discuss system design decisions
- How-to of selected concepts
- Examples
- Pointers to tutorials
- Guidance for student projects

Topics (tentative)

- Architecture models
- Sockets and multiprocessing
- Dynamic discovery
- Multicast
- Logical time
- Clock synchronisation

What do you have to do?

STUDENT PROJECT

Objective

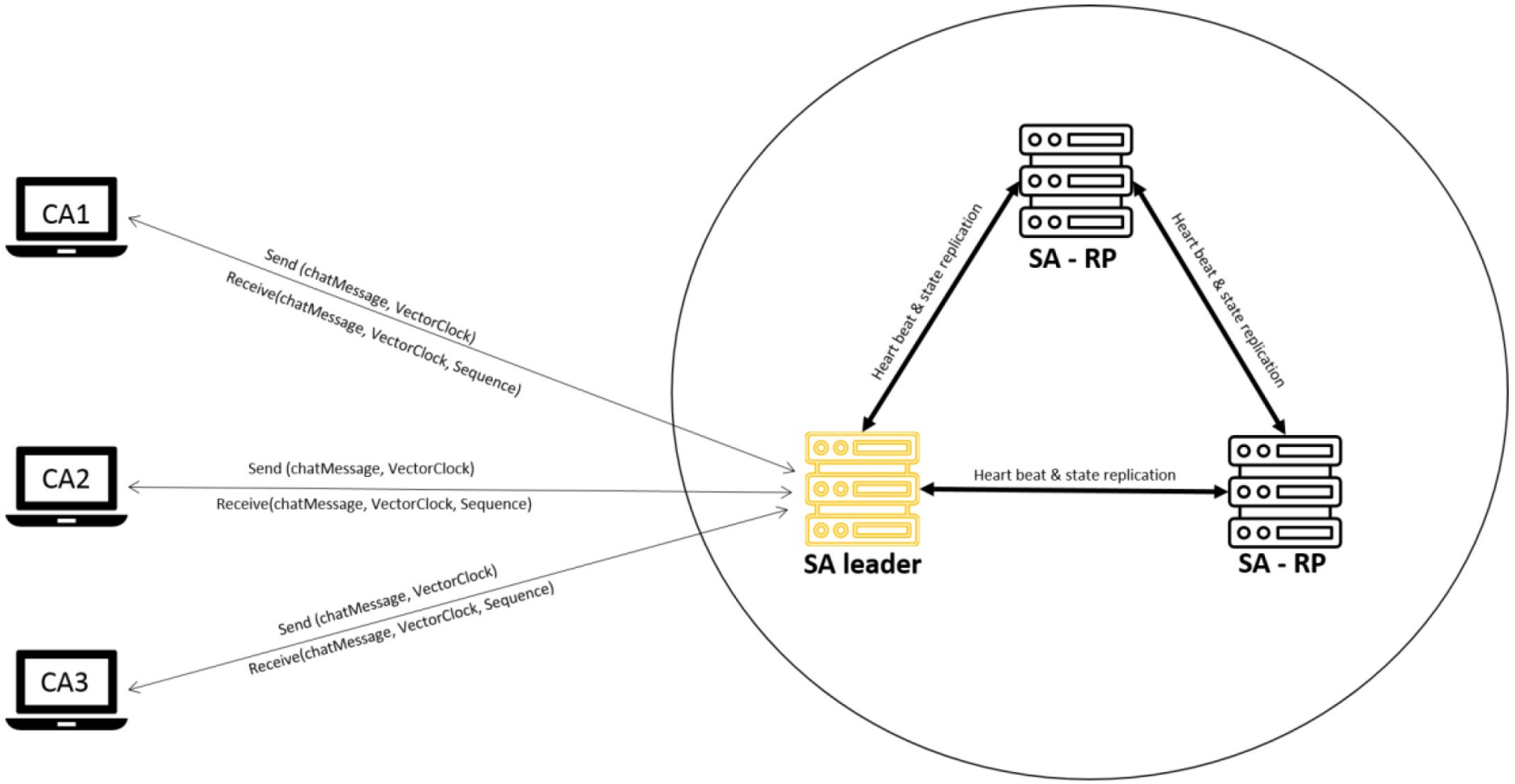
Design and implementation of a distributed system

Your project idea

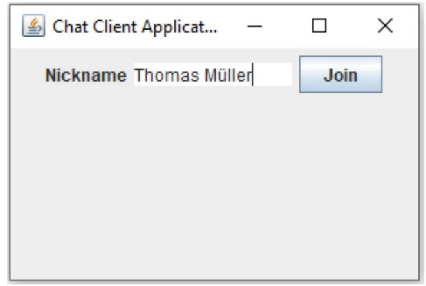
Develop a project idea with distribution properties

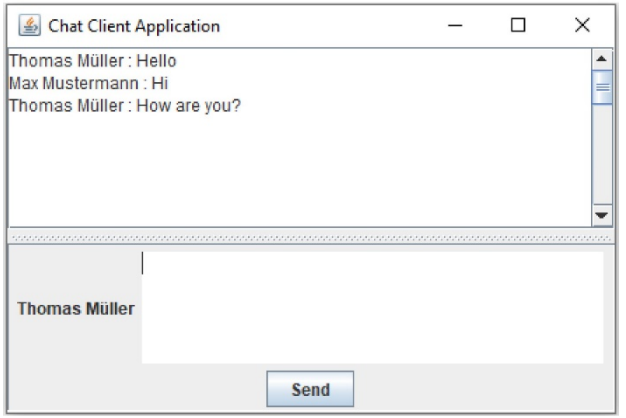
PROJECT EXAMPLE

Chat application



CA = Client Application
SA = Server Application
RP = Replica





LOGISTICS

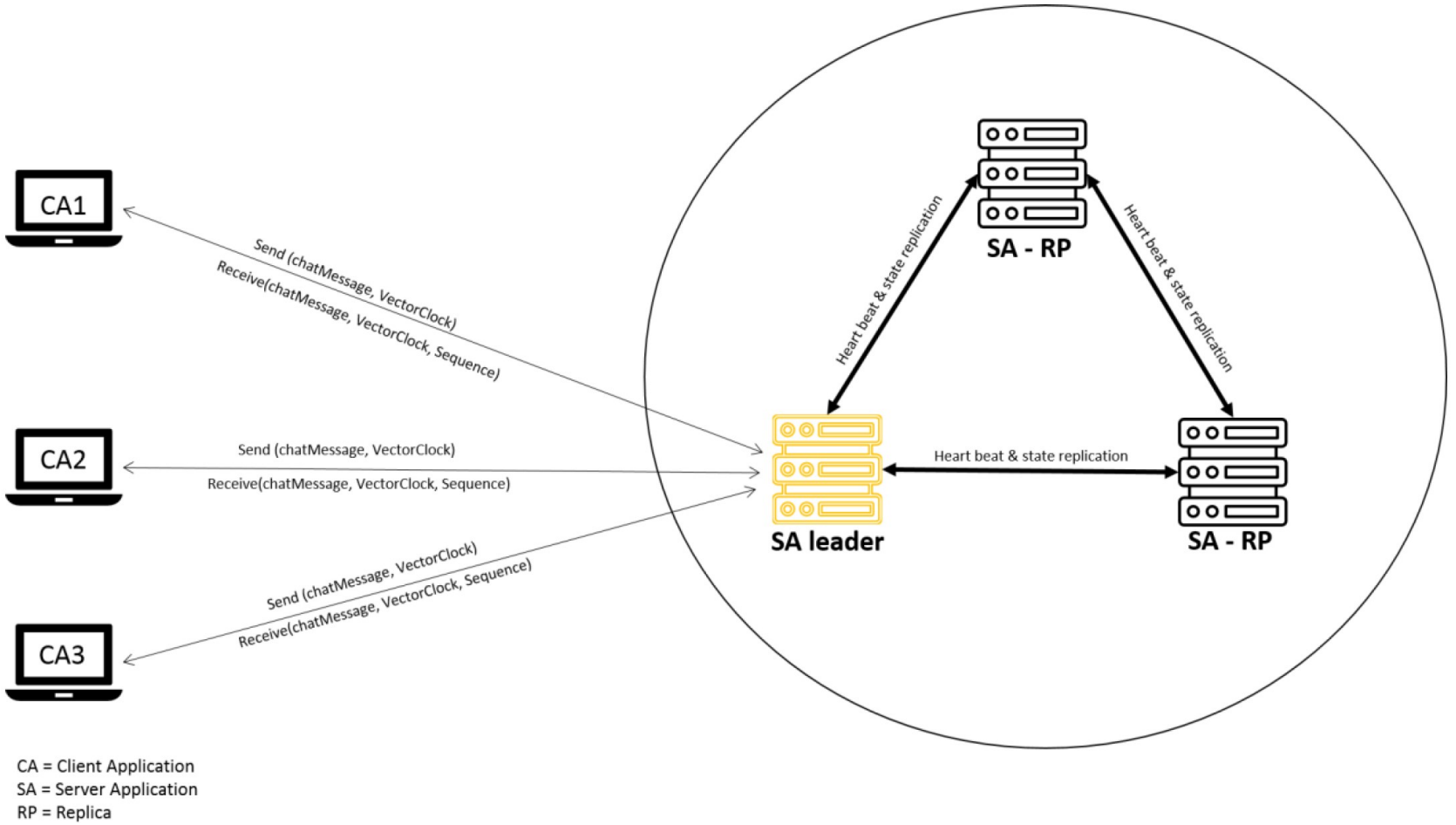
Groups

- Groups of three students
  - Self-organising
  - Collaborate with each other (e.g., GitHub, Slack, Trello)
  - Distribute work equally
  - Everyone contributes
- Each group gets a number
  - Use that number as ID for your group

Project requirements

- Dynamic discovery of hosts
- Voting
- Fault tolerance
  - Crash faults are must
  - Omission and Byzantine faults for higher mark
- Ordered reliable multicast
- Architecture model

Chat application



Project requirements:

- **Dynamic discovery of hosts**
  - Multicast messages
- **Voting**
  - LCR algorithm
- **Ordered reliable multicast**
  - Unicast with vector clocks (membership messages)
  - Multicast with vector clocks and NACK (chat messages)
  - Unicast with sequencing (NACK)
- **Fault tolerance**
  - Leader crash
  - Replica crash
- **Architecture model**
  - Client-server model

Deliverables

- Project description
- Project intermediate report
- Project final report
- Project demo

Project description

- Maximum1000 words
- Mandatory sections
  - Introduction
  - Requirements analysis
  - Architecture design
- PDF

Project intermediate report

- Maximum 3000 words
- Mandatory sections
  - Introduction
  - Requirements analysis
  - Architecture design
  - Implementation overview
- PDF

Project final report

- 5000 words (±1000)
- Mandatory sections
  - Introduction
  - Requirements analysis
  - Architecture design
  - Implementation
    - Give a link to code repository (e.g., GitHub, Bitbucket, etc.)
  - Discussion and conclusion
- PDF

Demo

- Two possibilities, exact format will be announced in due course

- In-person demo
  - Schedule will be announced in due course
    - Slot per group
  - Be prepared
  - Max 15 min

- Online demo
  - Video of max 10 minutes
  - Online Q&A session
    - Schedule and videoconferencing details will be announced in due course

How to submit?

- RELAX
  - Project description
  - Project intermediate report
  - Project final report
  - Demo (if online)

Important dates

Item	Deadline
Group registration	May 4, 2020
Project description	May 15, 2020
Project intermediate report	June 8, 2020
Project final report	July 2, 2020
Project demo	July 6, 2020

PROJECT DISCUSSION SESSIONS

Organisation

- 10-min slot per group

Group ID	Time slot	Group ID	Time slot
01	15:30	09	16:50
02	15:40	10	17:00
03	15:50	11	17:10
04	16:00	12	17:20
05	16:10	13	17:30
06	16:20	14	17:40
07	16:30	15	17:50
08	16:40	16	18:00

Organisation

- Each group presents their project idea
  - What is your distributed application about?
  - What is the initial idea for the architecture design?
  - How would you address the project requirements?
- Reiterate the project considering the feedback received

Q&A

Do we have to you a specific programming language?

No, feel free to use programming language(s) of your choice

Do we need to develop a graphical user interface?

No, graphical user interface is not required.