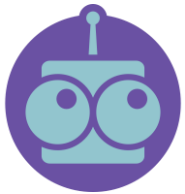

Video-Rooms

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Video-Rooms

High performance, personalized WebRTC service for B2B customers

SME continuous call – Stage 1

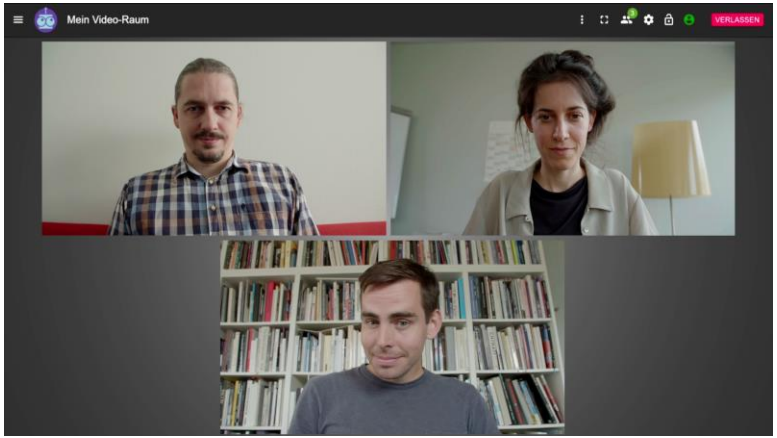
Online review

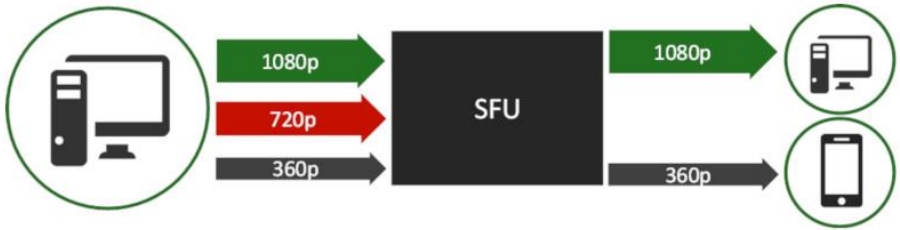
04.02.2022

Background and motivation

- Video-Rooms is a WebRTC videoconferencing service developed as an answer to the need for secure online meetings during the COVID-19 pandemic. It is a B2B solution offered to companies in Germany, wanting to meet their clients online.
- What makes Video-Rooms different from services like Zoom or Teams is:
    - personalization – meeting rooms have the company logo, name and domain of our customers
    - browser-based – clients of our customers join with just a web-browser
    - anonymity – no person-related data is recorded.
- These features allowed us to gain customers wanting a trustworthy meeting place for their clients, such as psychologists, lawyers, therapists, high schools, music schools and other companies.
- Each of our customers have different usage profiles of their Video-Rooms, some have one to one meetings, some have small group meetings and schools have up to 100 users in one room. From our current experience, it is difficult to define the needed server infrastructure to allow the flexibility of providing a high availably service in all those scenarios, in a cost effective way.

Solution





Features

- Videoconferencing
- Multiple cameras from one user
- Screen sharing
- Chat
- File sharing
- Selective Forwarding Unit (SFU)
- Simulcast encoding

Solution

Our service relies on a multi-tier architecture:

- server – a bare-metal or virtual server machine with a given amount of CPU cores and RAM.
- Video-Rooms SFU – our service uses a Selective Forwarding Unit (SFU) to provide connectivity between all participants and ensures advance media routing options like simulcast, moderator actions, multi-video participants.
- worker – a process running on a dedicated server CPU core, providing the SFU services. The number of works is up to the number of the CPU cores available on a server.
- router – a virtual object created on each worker by a room (see next bullet point), allowing to spread the load of a given room over various workers.
- room – a virtual object grouping all users participating in the same videoconferencing session.

Experiment description

CONCEPT AND OBJECTIVES

- Get to know the Fed4FIRE+ platform and design the experiment
- In our experiment we have tested and measured the capacity of our SFU in the different scenarios, to ensure appropriate server configuration for various customers
- We have defined a set of most common usage scenarios, varying the parameters listed on the next slide, and run multiple test combining rooms of same and various scenarios on a server.

Experiment description

CONCEPT AND OBJECTIVES

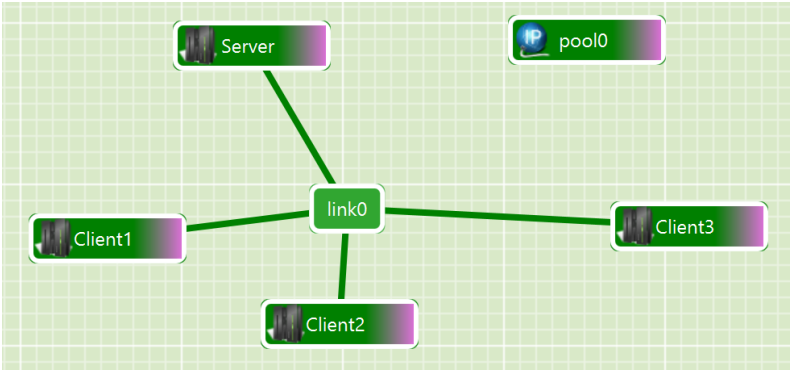
The load per worker and the total load of the machine depends on such parameters as:

- number of users in a room
- number of enabled video producers (webcam, screen sharing, additional video inputs)
- number of enabled audio producers (microphone, screen sharing audio)
- number of active video consumers (users having a given video displayed)
- number of active audio consumers (users listening to a given audio stream)

Experiment description

EXPERIMENT SET-UP

- For the experimentation, we have used the Virtual Wall (imec) testbed.
- We have used 4 machines, each equipped with a 16 core Intel(R) Xeon(R) E5620 @2.40GHz CPU.
- One machine was running our server software with the SFU.
- Three machines have been used to run our headless client that we have run in a docker container.
- We have used a public IP address on the server to generate SSL certificates using Let's Encrypt, as all WebRTC communication has to run with HTTPS.



Project results

MEASUREMENTS

As Stage 1 had a very limited time-frame we have run initial experimentation with grouped scenarios of the same type. This has allowed us to measure the maximum rooms that a server with a given number of CPU cores can handle and the maximum number of users per router.

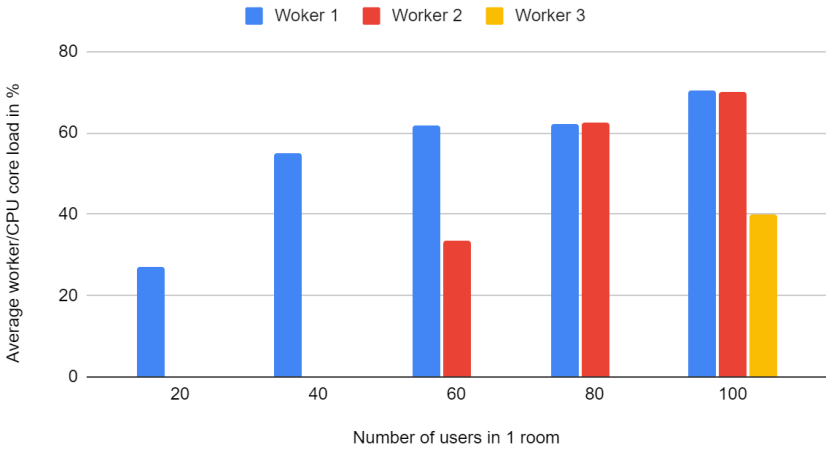
We have run the experimentation for the following grouped scenarios:

- 2 users in 1 room on 1 worker – how many rooms per worker/CPU core supported?
- 4 users in 1 room on 1 worker – how many rooms per worker/CPU core supported?
- 20 users in 1 room on 1 worker – how many rooms per worker/CPU core supported?
- 100 users in 1 room on multiple workers with router size 40 – how many workers/CPU cores needed?
- 1 room on multiple workers/CPU cores with router size 40 – how many users can access?

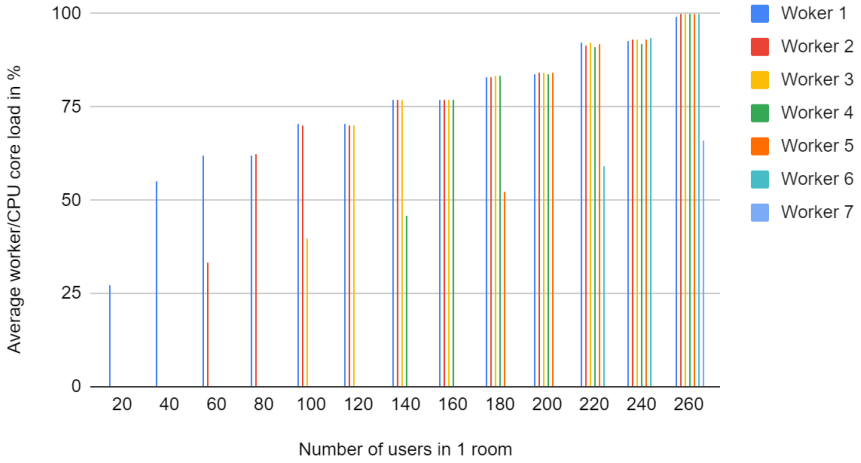
Project results

MEASUREMENTS (EXAMPLES)

100 users in 1 room



Max. users in 1 room with router size 40



Project results

MEASUREMENTS

Summarizing, during our experimentation we have found out, that on a sever equipped with 2.40GHz CPUs, we can:

- Run 30 2-user rooms per CPU core
- Run 22 4-user rooms per CPU core
- Run 3 20-user rooms per CPU core
- Need 3 CPU cores for a 100-user room
- Can have a maximum of 240 user in 1 room

Project results

LESSONS LEARNED

- The tricky part is that when adding an additional router on a new worker, you have an overhead of routing users between the workers.
- To enable better optimization of infrastructure usage, we have to group our users depending on the type of the meetings they conduct.

Business impact

VALUE PERCEIVED

- In Stage 1 we have gained vast knowledge about the Fed4FIRE+ testing tools and the Virtual Wall testbed.
- We have designed our initial experiment and were able to conduct first test.
- Form the experiment we have gained new knowledge about how to better optimize our infrastructure usage. We have calculated safe numbers of various rooms that we can provide using a single CPU core.
- In total having reached this goals within 3 months with less than 2 PMs used makes it a great RoI.

Business impact

WHY FED4FIRE+?

- The federated test-beds have made it possible to choose a test-bed that fits our needs and the set of tools allowed to quickly plan and execute the initial experiment

- The available funding allowed us to pay for the additional development work, that had to be conducted.

Feedback

USED RESOURCES AND TOOLS

- Virtual Wall (imec) testbed
    - 4 machines, each equipped with a 16 core Intel(R) Xeon(R) E5620 @2.40GHz CPU – the reservation, setup of the OS and configuration was easy.
    - jFed – is a good tools and allows for easy reuse of a designed experiment.

Feedback

ADDED VALUE OF FED4FIRE+

- We got good support from the technical teams and also the administrative part was very light.
- The process of starting the extermination was straightforward, and as we already have known jFed, we only had to get to know how to reserve resources in the testbed.
- In our opinion the federated testbed gives great experimentation possibilities, especially for big and complicated networking projects.
- We have used only a fragment of the large possibilities available in Fed4FIRE+, but we think, that also allowing such small-scale experiments, bring large benefits to SMEs like ours.

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THANK YOU VERY MUCH

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