Acapella

Team D5

Remote Sound Recording

Application area

- Free, easy to use web app
- Allows user to collaborate with ensemble members remotely
- Takes care of latency and audio delay

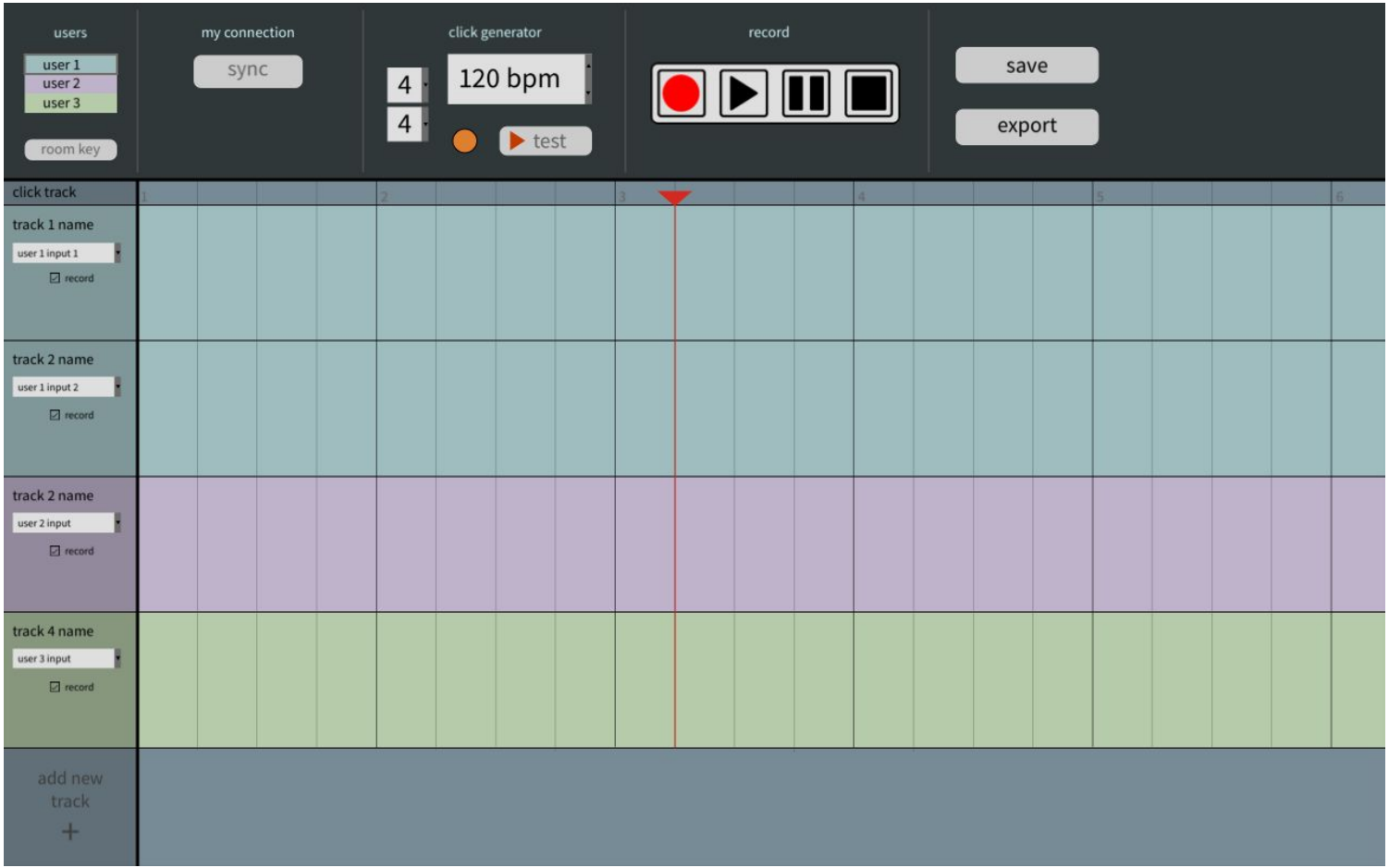
Django Server with peer-to-peer socket connection

Solution approach

- Django - simple web server operations
  - Storing HQ audio on the server

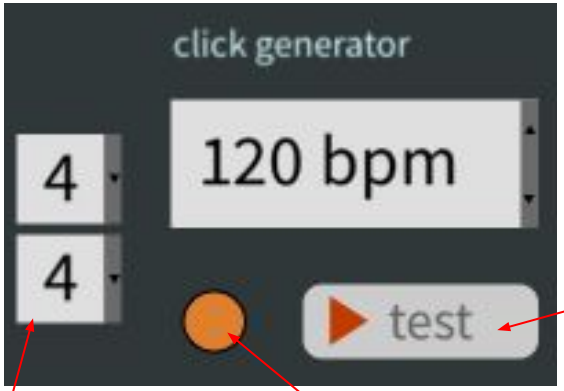
- Sockets - listening to each other in real-time
  - For monitoring ONLY
  - Minimal latency at the expense of quality

UI Demo


users
user 1
user 2
user 3
room key
my connection
sync
click generator
4
4
120 bpm
test
record
save
export
click track
track 1 name
user 1 input 1
record
track 2 name
user 1 input 2
record
track 2 name
user 2 input
record
track 4 name
user 3 input
record
add new track
+

Tracks are color-coded by user

copies room key to clipboard

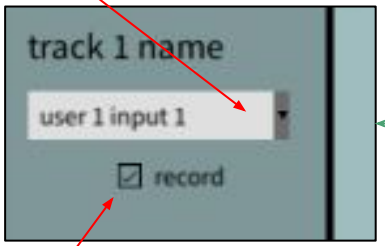


test play the click track

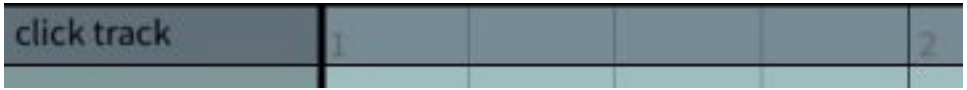
Adjust time signature

Flashing light: visual cue for beat

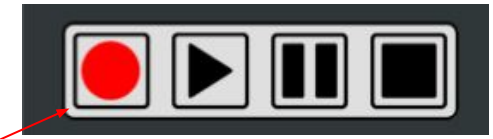
Select audio input



Timeline adjusts to selected meter

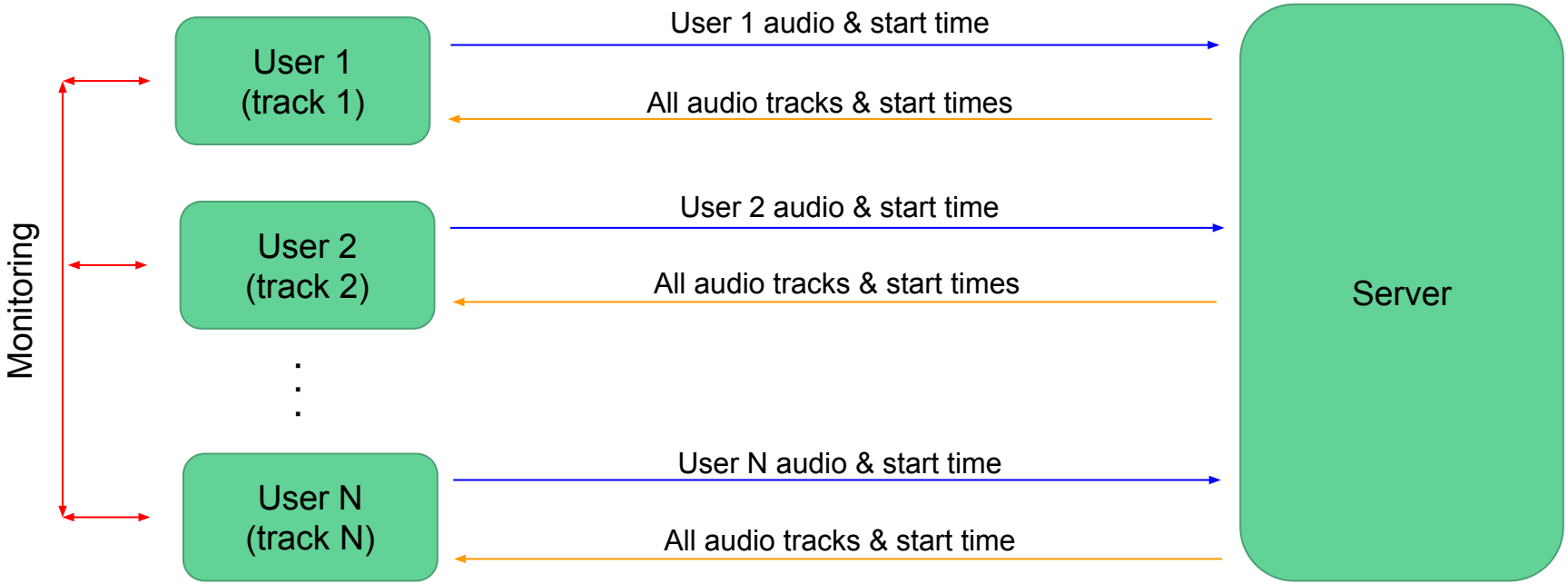


Toggle recording

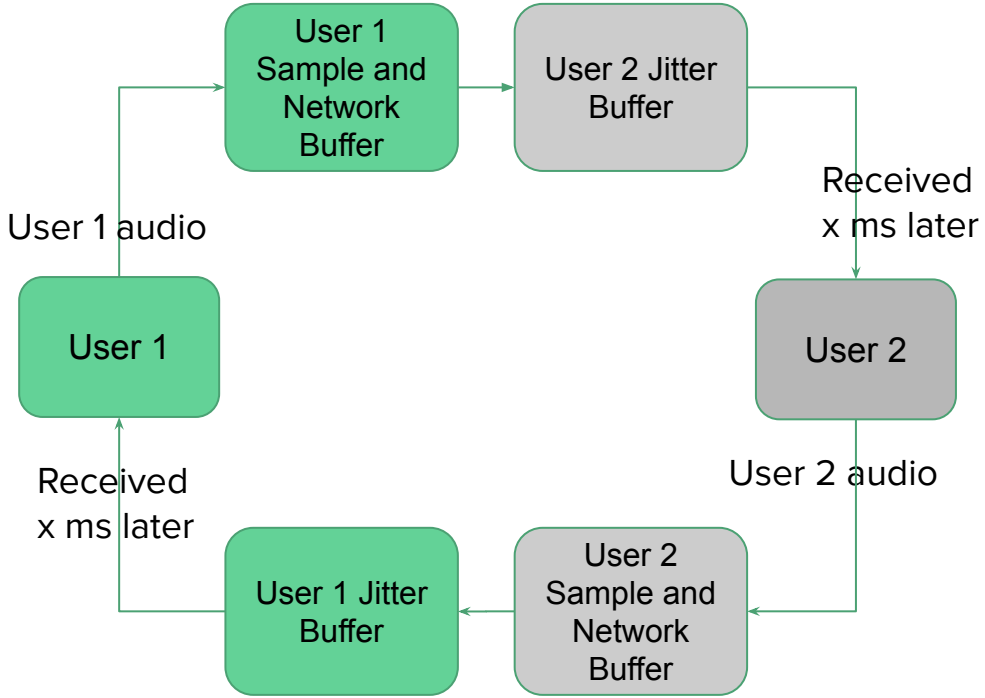


Start recording for all selected tracks

High-Level System Diagram

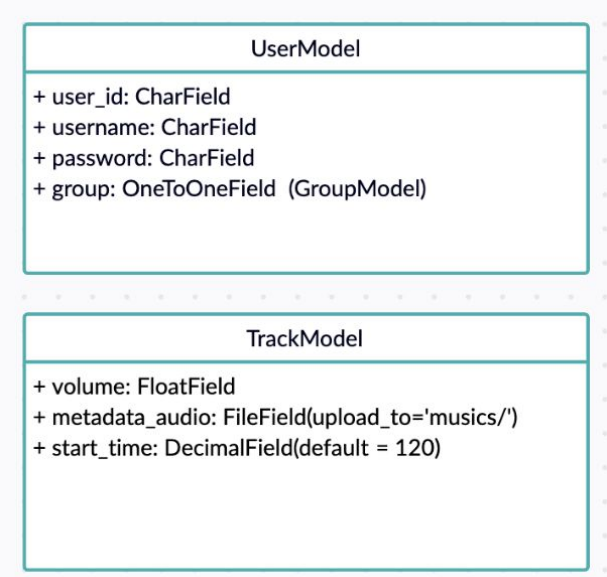


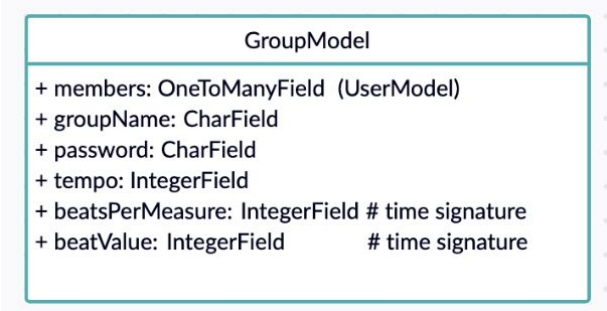
User to User Connection



- Every user's audio will be sent through buffer
  - Sample buffer - affects latency
  - Network buffer - affects quality
  - Jitter buffer - regulates incoming audio
- Prioritize minimizing latency over quality
- With multiple users, adjust to the user with the slowest connectivity

Django Model Diagram





Latency

Metrics and Validation

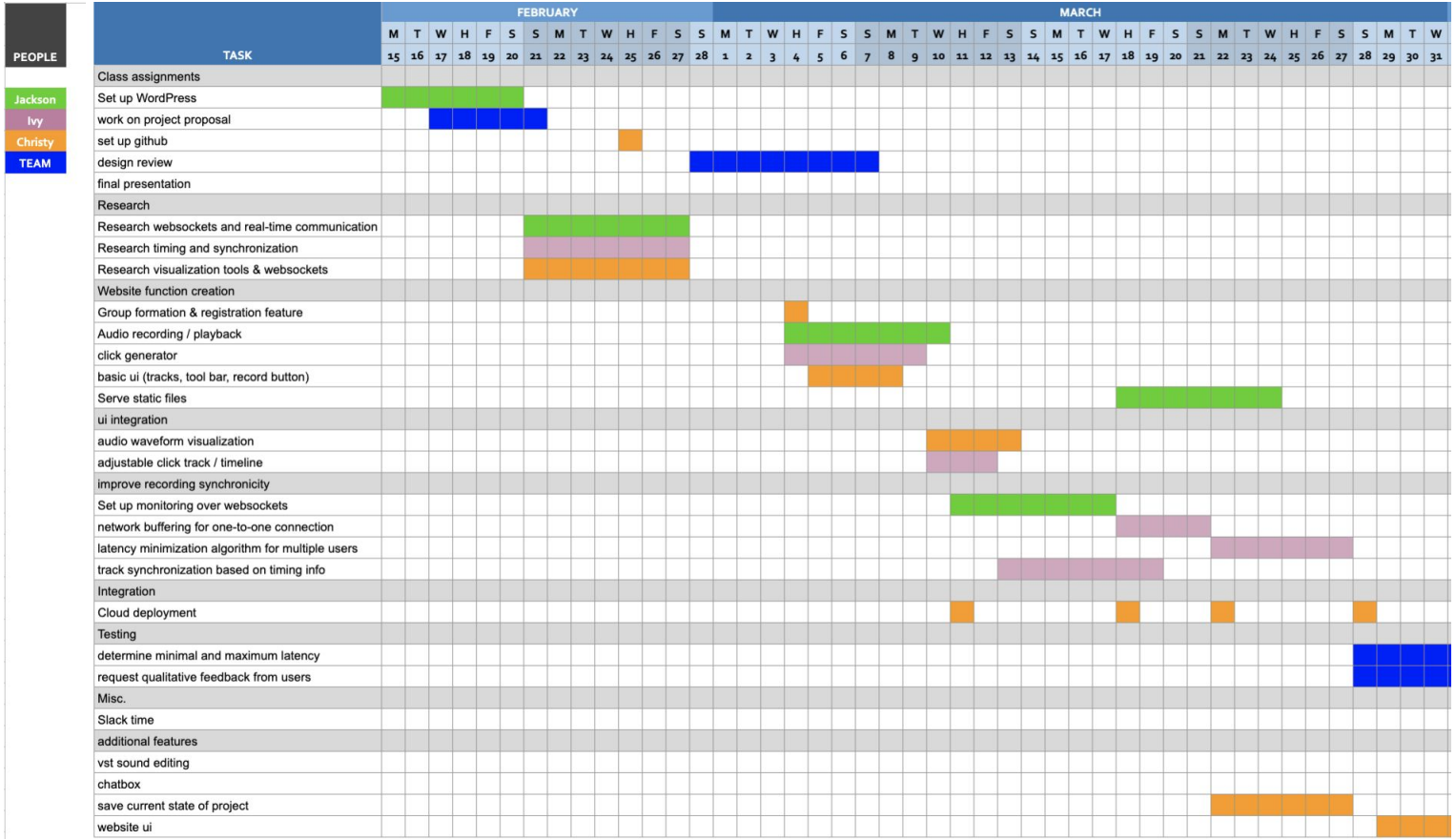
- How to measure?
  - With each packet sent, also send current (UTC) time
  - With each packet received, compare to current (UTC) time
  - Difference is the latency

- What is good?
  - 100ms perceived as instantaneous (1968 study by Robert Miller)
  - SoundJack - 60ms

Additional Metrics

- Monitoring Quality
  - less than 5% packet loss
  - compare packets sent to received
- Intuitive UI
  - less than 5 seconds to navigate
- Risk Factors
  - Hardware malfunctions
  - Unstable network

Gantt Chart (Feb - March)



Gantt Chart (April - May)