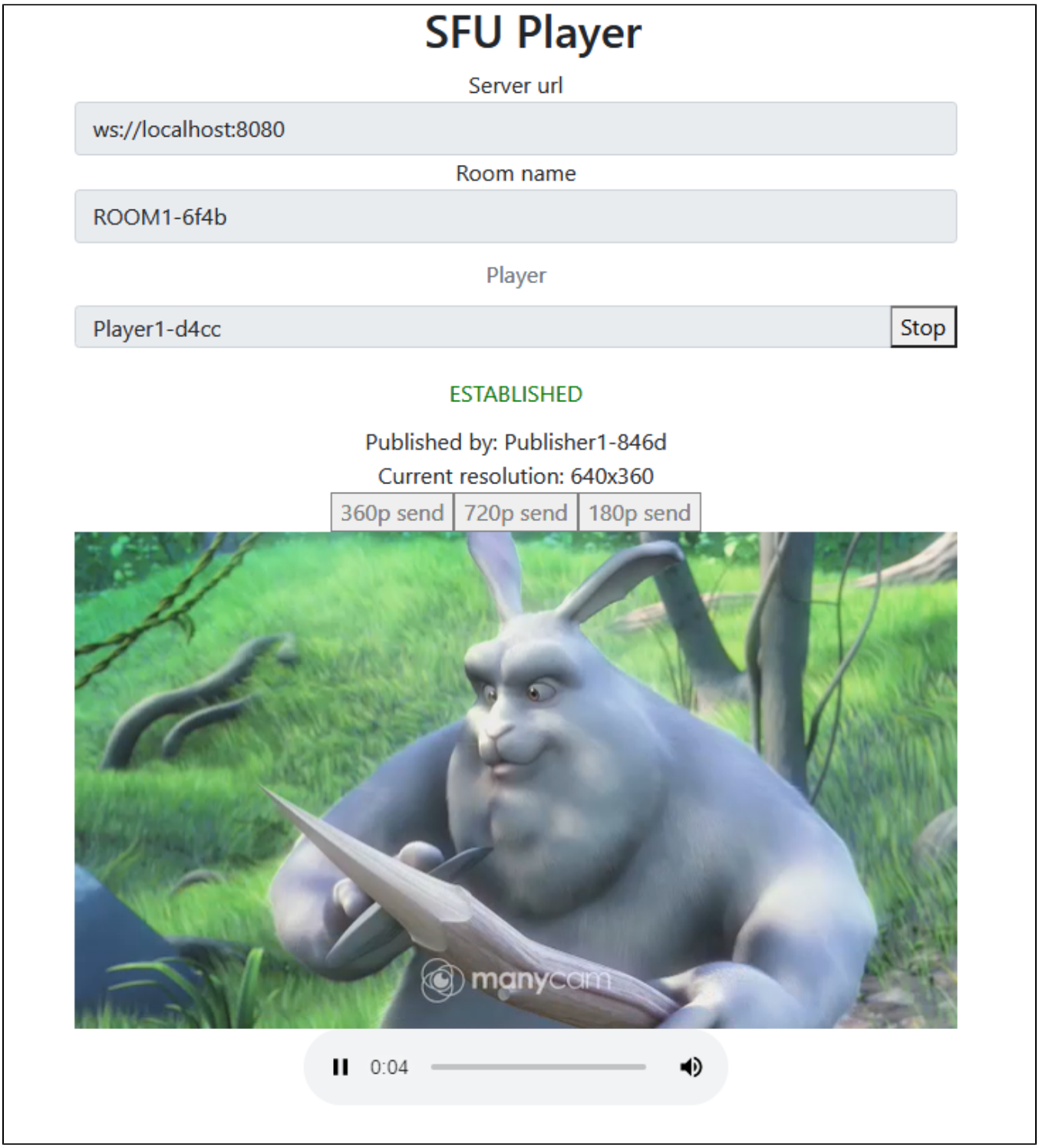
SFU Player

The example shows how to play a number of streams in one WebRTC connection with simulcast. A room is considered to be a publishing unit, that is, viewers who connect to this room receive all the streams published in it.

On the screenshots below:

- Server url - Websocket URL of WCS server
- Room name - room name
- Player - viewer user name
- 360p, 720p, 180p send - quality switch buttons



Note that audio tracks are playing in a separate`audio`tags.

Example source code

The source code consists of the following modules:

- player.html - HTML page
- player.css - HTML page styles
- player.js - main application logic
- config.json - client configuration file, contains streams publishing description

Analyzing the code

To analyze the example source code, take the file player.js version with hash 7bd8412 available here

1. Local variables

Local variables declaration to work with constants, SFU SDK, to display video and to work with client configuration

code

```
const constants = SFU.constants;
const sfu = SFU;
let mainConfig;
let remoteDisplay;
let playState;
const PLAY = "play";
const STOP = "stop";
const PRELOADER_URL="../commons/media/silence.mp3"
```

2. Default configuration

Default room configuration to use if there is `noconfig.jsonfile` found

code

```
const defaultConfig = {
    room: {
        url: "ws://127.0.0.1:8080",
        name: "ROOM1",
        pin: "1234",
        nickName: "User1"
    }
};
```

3. Object to store current publishing/playback state

The object should keep Websocket session data, WebRTC connection data and room data, and shoukd form HTML tags ids to access them from code.

code

```
const CurrentState = function(prefix) {
    let state = {
        prefix: prefix,
        pc: null,
        session: null,
        room: null,
        set: function(pc, session, room) {
            state.pc = pc;
            state.session = session;
            state.room = room;
        },
        clear: function() {
            state.room = null;
            state.session = null;
            state.pc = null;
        },
        buttonId: function() {
            return state.prefix + "Btn";
        },
        buttonText: function() {
            return (state.prefix.charAt(0).toUpperCase() + state.prefix.slice(1));
        },
        inputId: function() {
            return state.prefix + "Name";
        },
        statusId: function() {
            return state.prefix + "Status";
        },
        formId: function() {
            return state.prefix + "Form";
        },
        errInfoId: function() {
            return state.prefix + "ErrorInfo";
        },
        is: function(value) {
            return (prefix === value);
        }
    };
    return state;
}
```

4. Initialization

init() code

The init() function is called on page load and:

- initializes state objects
- reads`config.json`file or default configuration
- initializes input fields

```
const init = function() {
    let configName = getUrlParam("config") || "./config.json";
    ...
    playState = CurrentState(PLAY);
    $.getJSON(configName, function(cfg){
        mainConfig = cfg;
        onDisconnected(playState);
    }).fail(function(e){
        //use default config
        console.error("Error reading configuration file " + configName + ": " + e.status + " " + e.statusText)
        console.log("Default config will be used");
        mainConfig = defaultConfig;
        onDisconnected(playState);
    });
    $("#url").val(setURL());
    $("#roomName").val("ROOM1-"+createUUID(4));
    $("#playName").val("Player1-"+createUUID(4));
}
```

5.Establishing server connection

connect(), SFU.createRoom() code

The connect() function is called by Publish or Play click:

- creates PeerConnection object
- cleans the previous session state displayed
- sets up room configuration and creates Websocket session
- subscribes to Websocket session events

```
const connect = function(state) {
    //create peer connection
    pc = new RTCPeerConnection();
    //get config object for room creation
    const roomConfig = getRoomConfig(mainConfig);
    roomConfig.pc = pc;
    roomConfig.url = $("#url").val();
    roomConfig.roomName = $("#roomName").val();
    roomConfig.nickname = $("#" + state.inputId()).val();
    // clean state display items
    setStatus(state.statusId(), "");
    setStatus(state.errInfoId(), "");
    // connect to server and create a room if not
    const session = sfu.createRoom(roomConfig);
    session.on(constants.SFU_EVENT.CONNECTED, function(room) {
        state.set(pc, session, room);
        onConnected(state);
        setStatus(state.statusId(), "ESTABLISHED", "green");
    }).on(constants.SFU_EVENT.DISCONNECTED, function() {
        state.clear();
        onDisconnected(state);
        setStatus(state.statusId(), "DISCONNECTED", "green");
    }).on(constants.SFU_EVENT.FAILED, function(e) {
        state.clear();
        onDisconnected(state);
        setStatus(state.statusId(), "FAILED", "red");
        setStatus(state.errInfoId(), e.status + " " + e.statusText, "red");
    });
}
```

6. Playback start after session establishing

onConnected() code

The onConnected() function:

- sets up Stop button click actions

- subscribes to room error events
- calls playback function

```
const onConnected = function(state) {
    $("#" + state.buttonId()).text("Stop").off('click').click(function () {
        onStopClick(state);
    }).prop('disabled', false);
    ...
    // Add errors displaying
    state.room.on(constants.SFU_ROOM_EVENT.FAILED, function(e) {
        setStatus(state.errInfoId(), e, "red");
    }).on(constants.SFU_ROOM_EVENT.OPERATION_FAILED, function (e) {
        setStatus(state.errInfoId(), e.operation + " failed: " + e.error, "red");
    });
    playStreams(state);
}
```

7.Streams playback

playStreams(), SFURoom.join() code

The playStreams() function:

- initializes a base container tag to display incoming media streams
- negotiates WebRTC connection

```
const playStreams = function(state) {
    //create remote display item to show remote streams
    remoteDisplay = initRemoteDisplay({
        div: document.getElementById("remoteVideo"),
        room: state.room,
        peerConnection: state.pc
    });
    state.room.join(state.pc);
}
```

8.Playback stopping

stopStreams(), remoteDisplay.stop() code

```
const stopStreams = function(state) {
    if (remoteDisplay) {
        remoteDisplay.stop();
    }
}
```

9.Play click action

onStartClick(), playFirstSound(), connect() code

- validates input fields
- in Safari browser, calls playFirstSound() before playback to automatically play incoming audio
- calls connect() function

```
const onStartClick = function(state) {
    if (validateForm("connectionForm") && validateForm(state.formId())) {
        $("#" + state.buttonId()).prop('disabled', true);
        if (state.is(PLAY) && Browser().isSafariWebRTC()) {
            playFirstSound(document.getElementById("main"), PRELOADER_URL).then(function () {
                connect(state);
            });
        } else {
            connect(state);
        }
    }
}
```

10.Stop click actions

onStopClick(), Session.disconnect() code

The onStopClick() function:

- stops playback
- disconects Websocket session

```
const onStopClick = function(state) {
    $("#" + state.buttonId()).prop('disabled', true);
    stopStreams(state);
    state.session.disconnect();
}
```

11.Websocket session disconnection actions

onDisconnected() code

The onDisconnected() functions:

- sets up Play click actions
- enables Server url and Room name fields access, if there's no parallel session

```
const onDisconnected = function(state) {
    $("#" + state.buttonId()).text(state.buttonText()).off('click').click(function () {
        onStartClick(state);
    }).prop('disabled', false);
    $('#url').prop('disabled', false);
    $("#roomName").prop('disabled', false);
    $("#" + state.inputId()).prop('disabled', false);
}
```