<u>Testing the example csd</u>

To establish communication between multiple machines on the same local area network, do things in the following order:

1. Launch the server
2. Launch the client(s) and join the group
3. Test communication by sending chat messages
4. Start the clock on the server
5. Start the client clock(s) and sync clocks to the server

Example Session:

First, open the RP-LaptopEnsembler.csd in CsoundQT on the server machine (let's call it HAL). Then BEFORE running it, open the Widgets window and type in the IP address for HAL as both Server IP and Local IP, and type HAL in as the user name. (I have found that as soon as you start running the CSD, Csound reads the GUI widgets and tries to open OSC ports using whatever is there. If they aren't already correct, nothing seems to work.) Next, start running the CSD, and then click "Run As Server." You should get the message "HAL has joined successfully" on the Notifications line.

Second, open the program in CsoundQT on the client machine (let's call it Dave). Again, before running it, open the Widgets window and type in HAL's IP for the Server IP, Dave as the User Name, and Dave's IP for the Client IP. Next, start running the CSD, and click the "Join" button. You should get the message "Dave has joined successfully" on both machines.

Third, type a message in the chat line on Dave (e.g., "Open the POD bay doors, HAL!") and click "Send." You should see the message echoed in the Chat History window on both machines. Type a reply on HAL (e.g., "Sorry, Dave!"), and again you should see the message on both machines.

Fourth, start the clock on the server machine (HAL) and the bar counter should begin to increment. Then, start HAL's Plucker or Simple Drummer instrument.

Fifth, start the clock on the client machine (Dave). You should see the bar counter begin to increment. Next, click "Sync Clock to External Server" and "Query Beat." The bar counter should jump to match that of the Server. Finally, start the Plucker and/or Simple Drummer on Dave.

Notes:

- If the server and client(s) are on the same LAN and you know that you are using the correct IP addresses, but you are unable to establish communication between client and server in Csound, there may be a firewall issue. Make sure that ports 50000 and 50001 are open on both machines.
- If the machines do not stay in sync consistently, it may be necessary to adjust the THRESH value on the client(s). This is the maximum amount of time permitted between the sending of a

time query and the receiving of a response from the server. If the network latency is generally high and the THRESH value is too small, you may not get any usable responses. If the network latency is generally low and the THRESH value is too large, then the synchronization will be unreliable. You should set the THRESH value as small (short) as possible, while still maintaining sync.

- Due to latencies in the audio hardware, it may be necessary to manually sync the playback between server and client(s). Once the machines' clocks are synchronized, turn on their Sync Blips. (Use different pitches to distinguish which is which.) Adjust the Delay time(s) on the machine(s) with the smallest latency to match that of the machine with the largest latency.

- Use the snapshots to make synchronized changes on all machines. For this to work properly, the snapshot numbers on all machines must be in agreement. (E.g., when snapshot N is loaded on all the machines, they must be in the same tempo and meter, even if the other parameters are different.) Once in the group, any user can schedule a snapshot change via the server. The change will always take place on a downbeat, and can be scheduled relative to the current bar, or at some specific (absolute) bar in the future. Multiple snapshot changes can be scheduled in advance.