

# **WFS System Game Of Life installation guide**

**WORK IN PROGRESS VERSION #0.1**

## Hardware

The WFS system consists of:

Hardware:

192	speakers	Seas coaxial 2-way
24	8-channel amplifiers	Hypex class-D (custom made)
12	active subwoofers	Hypex class-D
24	DA converters	Behringer ADA-8000
8	PCI-based audio interfaces	MOTU 2408mk3
2	PCIe-cards	MOTU PCIe-424
2	rendering servers	Apple Mac Pro 2.8GHz 8-core
1	Firewire audio interface	MOTU 828mk2
1	control laptop	Apple MacBook white 1.86Ghz dualcore
1	adat to network converter	HEAR extreme adat extender in
1	network to adat converter	HEAR extreme adat extender out
1	gigabit network switch	D-Link

Cables:

96	speakon, directly connected to speakers
192	xlr-xlr short (DA converters to amplifiers)
12	xlr-rca (ampifiers to subwoofers)
27	optical toslink (various sizes)
16	optical toslink extensions (short cable + extender)
9	firewire (8 x MOTU PCI to interface and 1 x MOTU 828)
4	network cat5 15-20m

The speakers, amplifiers, DA converters and MOTU units are mounted in 24 mobile trolleys. They consist of a steel frame and a flightcase, and have wheels. Each trolley gets 2 power lines, one for the MOTU's and the DA's and one for the amplifiers.

### Connections

There are many types of connections in the system. Most of them are made inside the cases and don't need to change when the system is moved. But in order to show the whole picture here all connections will be shown. We start at the end point: the speakers. They are connected using speakon cables to the amplifiers. The amplifiers are custom made, and have their connections at their front side. These are at the back of each trolley. The amplifiers are mounted upside-down for convenience. Each speakon cable holds 2 speaker lines, so per trolley of 8 speaker there are 4 connections.

Every trolley also holds a Behringer ADA8000. These are connected to the amplifiers inside the trolley case, using 8 short xlr-xlr cables. The behringers are also mounted upside-down.



a Behringer ADA-8000 DA converter (front)

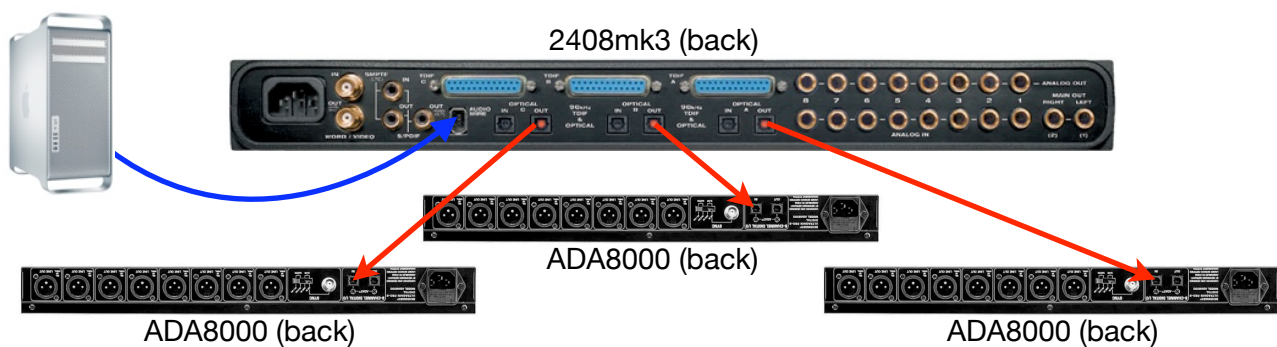
Each ADA8000 has one ADAT toslink optical cable connected to its input. The "sync" switch, next to this input, is set to "slave, ADAT". The small green light marked "lock" on the front panel of the ADA8000 indicates whether the connection is there. The toslink cable comes from the nearest MOTU 2408mk3 unit.



In every three trolleys there is one containing a MOTU 2408mk3 unit. These units are the link between the computers and the rest of the hardware.



a MOTU 2408mk3 unit (front)



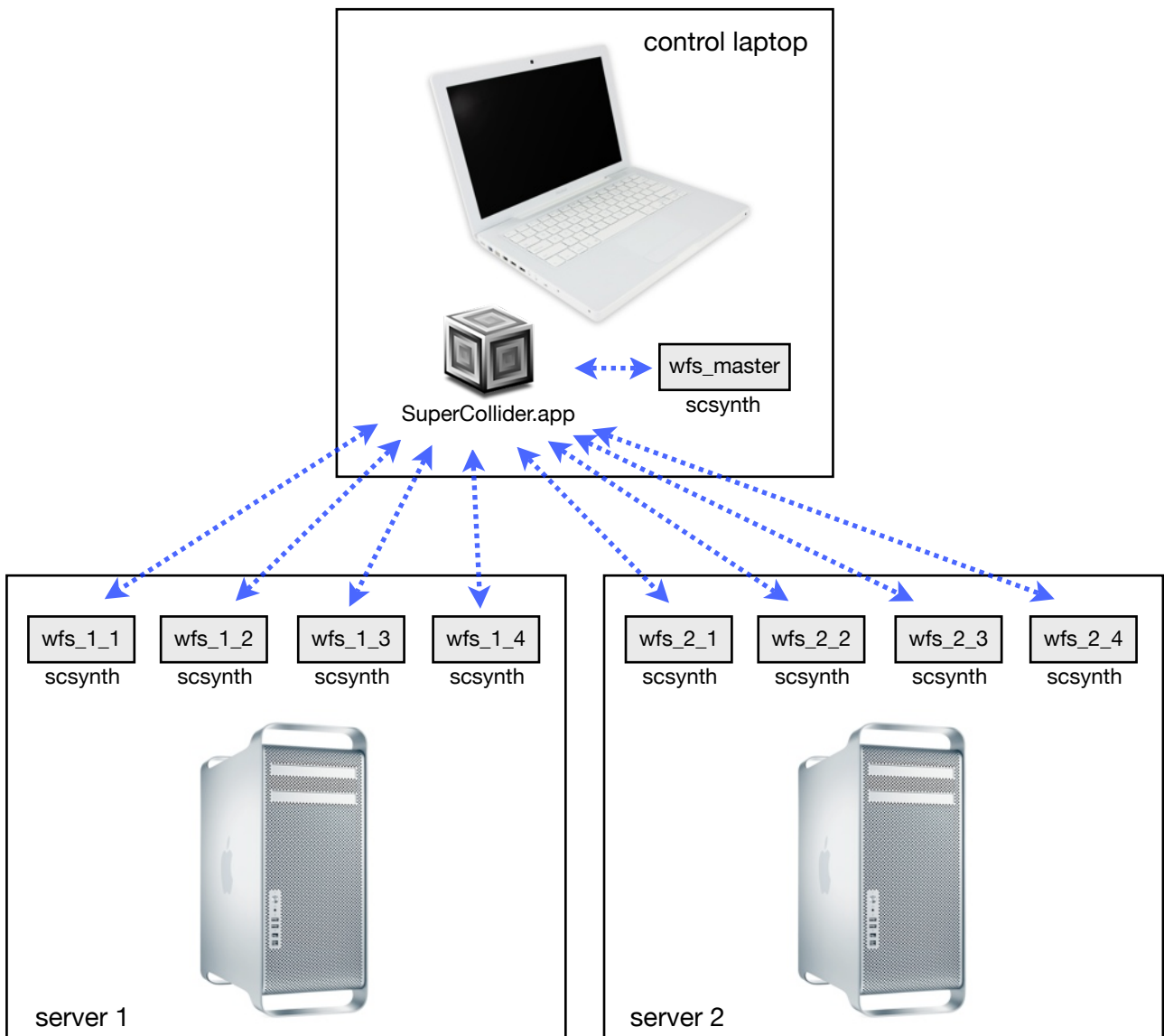
**Software**



The Game Of Life WFS system runs on a software package named *SuperCollider*. SuperCollider is an audio synthesis programming language which provides the basic needs for developing audio software. The WFS interface and engine are a plugin library for SuperCollider, written by Wouter Snoei and Jan Trutzschler. In order to get to know the system there is also some information required about how SuperCollider works.

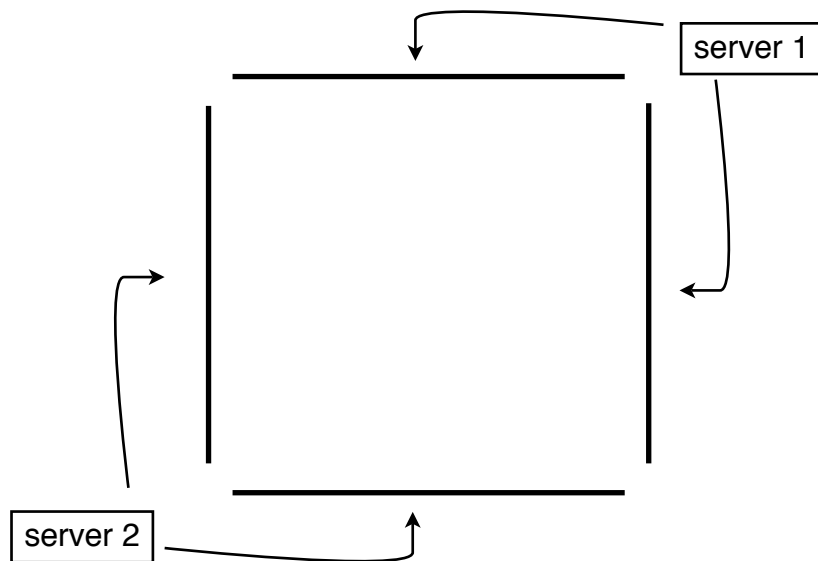
The program is divided in two parts: a *language* interface, which holds the user front-end, and a *synthesis* application, which performs the actual audio synthesis. These two applications communicate via network (UDP) messaging. One language application (SuperCollider.app) can control multiple synthesis applications. The synthesis applications are usually referred to as “Server”, but are also sometimes called “scsynth” (which is the name of the actual application). In this manual they will always be called scsynth from now on, in order to prevent confusion with the two rendering computers, which we call servers.

In the Game Of Life system the graphical user interface runs on SuperCollider.app (the language application) on the control laptop. There is also one scsynth playing on the control laptop, which is named “wfs\_master”. The two rendering servers both run multiple scsynth apps, all controlled from the SuperCollider app in the control laptop. Each server runs 4 or 8 scsynth applications, named “wfs\_1\_1”, “wfs\_1\_2” etc.



## The servers

Each of the two rendering servers can drive 96 speaker channels. In the usual setups both servers are used to do one half of the system. Typically one server drives two “walls” of the system.



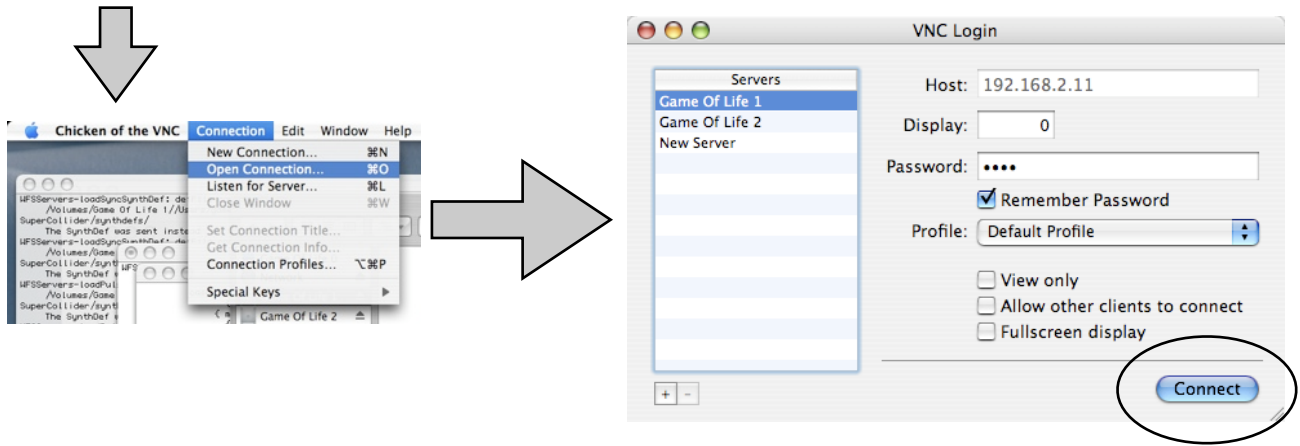
Both servers are full functional computers, but have no keyboard, mouse or screen. They are controlled from the control laptop, to which they connect via the network switch.



clockwise: the case of Server 1, the network switch, the network connection to the control laptop (blue cable), the network connection to a server

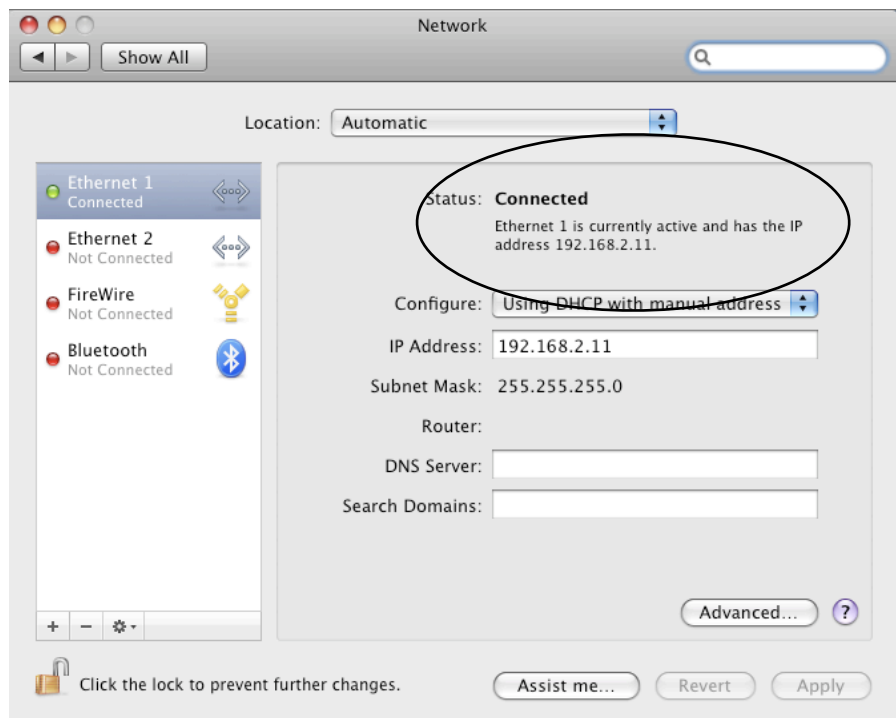
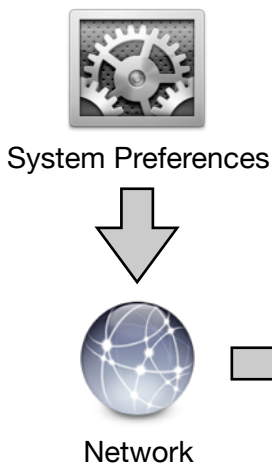


The servers can be operated through screen sharing, with the software application named *Chicken of the VNC*, located on the control laptop's dock. Use this to check or change the settings panels for the MOTU 2408mk3 audio interfaces and for general troubleshooting. When both servers are running they should show up in *Chicken of the VNC*'s "open connection" window. Press "connect" to start screen sharing for the selected server. They are named "Game of life 1" and "Game of life 2".

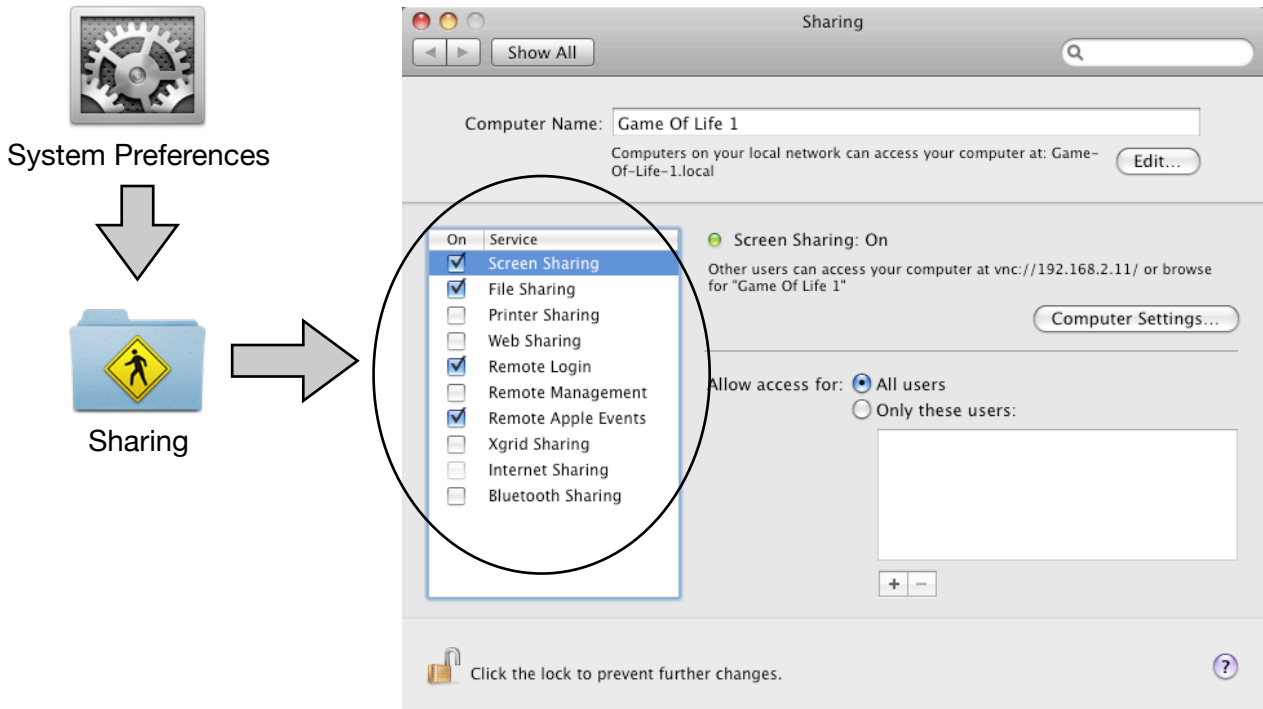


### The Servers: Network settings

The network settings for both servers need to be correct for the system to work properly. The IP addresses are fixed. Server 1 has IP address 192.168.2.11, Server 2 has IP address 192.168.2.12. These settings rarely change on their own, but in case they're lost they can be made again through screen sharing (with *Chicken of the VNC*). The network settings can be made in *System Preferences* → *network* on the server.



Next to the IP address, a number of other settings should be made correctly in the *sharing* panel. Screen Sharing, File Sharing, Remote Login and Remote Apple Events should all be checked, the rest unchecked.



### The control laptop

The control laptop is the white Macbook from which the system is operated. It is connected to the system with a network cable (blue) and a firewire cable. To start up the system interface on the laptop you need to startup *SuperCollider* on it. The SuperCollider icon is located on the dock, which shows up when moving the mouse to the bottom of the screen. From there the whole system can be controlled. When the system is up and running the *WFSservers* window is displayed on the screen.

This window shows the status of the system. The red rectangles show the running status of each *scsynth* application. In order to make full use of the multiple cores of the rendering server, multiple *scsynth* applications are activated. Each server can run 4 or 8 *scsynth* apps (the example here has 4 *scsynth* apps per server). The gray numbers in the white boxes show the measured *sync delays*. These typically look like random whole numbers between 0 and 127. The sync delays can be obtained or updated with the “get sync delays” button. The system needs these values to run. Every time a one or more *scsynth* apps are quit or restarted the values change. If they also change when no *scsynth* was restarted, it indicates a problem with hardware synchronisation. More about this can be read in the *troubleshooting* section. In general it is advised to press the “get sync delays” button twice at a first run, to see if the values are stable.

