Medusa - A Distributed Sound Environment

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Mobile Interactive Musical Processes
http://www.eca.usp.br/mobile/portal/

May 07, 2011

Outline

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- Related works

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- Future works

Scenario

This project is part of Mobile (Interactive Musical Processes) research group.
The research group involves Musicians, Electrical Engineers, Computer Scientists, Visual Artists, ...

Goals

- Speed up network music setup
- Create a network music environment
- Rich range of interaction possibilities
- Local Area Network as Case Study

Related work

Some related work address the problem of synchronous music communication between networked computers, such as

- OSC [Lazzaro and Wawrzynek2001]
- NetJack [Carôt et al.2009]
- SoundJack [Carôt et al.2006]
- JackTrip [Cáceres and Chafe2009b, Cáceres and Chafe2009a]
- eJamming [Renaud et al.2007]
- Otherside [Anagnostopoulos2009]
- LDAS [Sæbø and Svensson2006]
- ReWire [Kit2010].

Methodology

Our Methodology intend to join different research areas to design a sound environment:

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- Network Music Performance

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- Map desirable features

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- Verify priorities and dependence

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Desirable Features...

- Transparency

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  - User text messages

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Development API

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System Architecture

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- Layered architecture in each computer (Node)
- Network messages to ensure environment integrity

Node Architecture

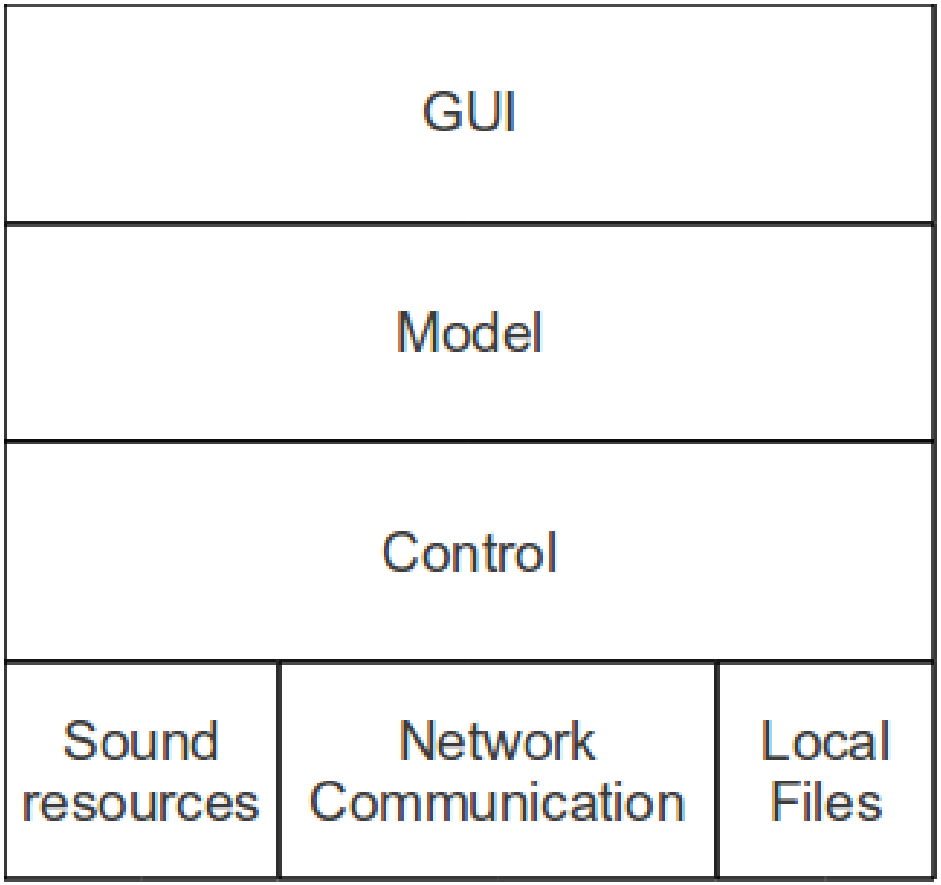

Figure: Node Architecture

Node Architecture - Resources

- Network Communication
  - UDP for BroadCast Communication
  - TCP for Unicast Communication
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- Configuration File

Node Architecture - Control

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Node Architecture - Model

Local Settings = Sound Settings + Network Settings
Sound Settings = SoundPorts + SoundConnections
Environment = All Nodes + Global Node Connections

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Local Settings = Sound Settings + Network Settings
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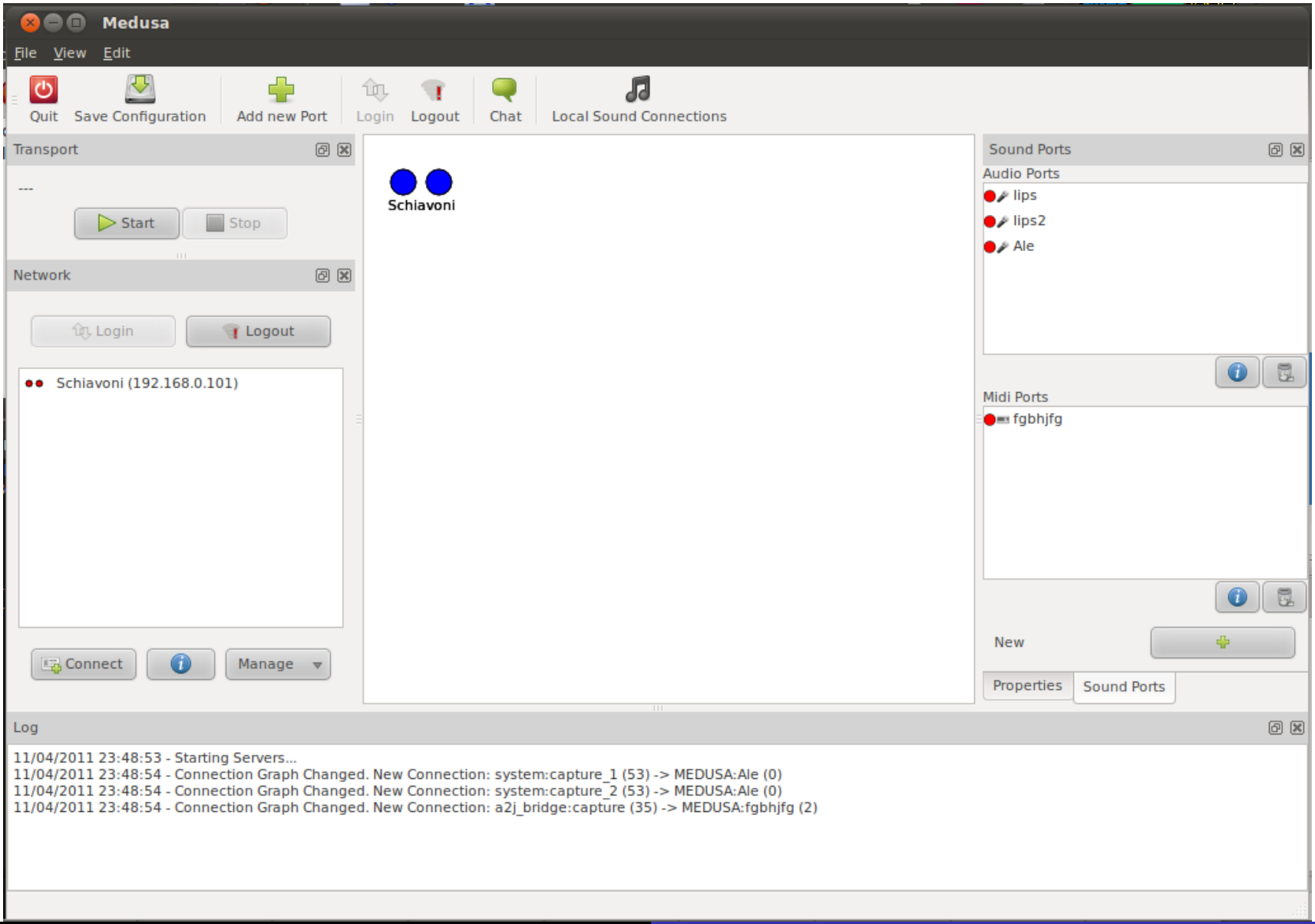
This model allows heterogeneous nodes and is easily extendable.

Node Architecture - GUI



Environment Maintenance

- Action Messages (Unicast)
  - add a port
  - connect a node

Environment Maintenance

- Action Messages (Unicast)
  - add a port
  - connect a node
- Information Messages (BroadCast)
  - port added
  - node connected

Environment Maintenance - Messages

HI_GUYS — HI_THERE — BYE

Environment Maintenance - Messages

HI_GUYS — HI_THERE — BYE
START_TRANSPORT — STOP_TRANSPORT

Environment Maintenance - Messages

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CONNECT_NODE — NODE_CONNECTED —
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ADD_PORT — PORT_ADDED — REMOVE_PORT —
PORT_REMOVED

Environment Maintenance - Messages

HI_GUYS — HI_THERE — BYE
START_TRANSPORT — STOP_TRANSPORT
CONNECT_NODE — NODE_CONNECTED — DISCONNECT_NODE — NODE_DISCONNECTED
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CHAT

Environment Maintenance - Messages

HI_GUYS — HI_THERE — BYE
START_TRANSPORT — STOP_TRANSPORT
CONNECT_NODE — NODE_CONNECTED — DISCONNECT_NODE — NODE_DISCONNECTED
ADD_PORT — PORT_ADDED — REMOVE_PORT — PORT_REMOVED
CONNECT_PORT — PORT_CONNECTED — DISCONNECT_PORT — PORT_DISCONNECTED
CHAT
LOOP_BACK

Environment Maintenance - The Messages

```
<msg bufferSize="512" ip="192.168.0.101" msgType="0"
      name="Flavio" sampleRate="44100" port="40000">
 <outputs>
  <audioOutput name="My Output 1"/>
  <audioOutput name="My Output 2"/>
 </ouputs>
</msg>
```

Figure: A HI_GUYS Message

Results

- Messages may help Network Music configuration

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- Possibilities of heterogeneous node configuration

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- GUI and configuration file speed up configuration

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- Possibilities of heterogeneous node configuration
- GUI and configuration file speed up configuration
- Environment view gives instantaneous feedback
- Difficulties in testing different network conditions

Future work

- Implementation of full desirable features list

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- Better thread-safe implementation

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- Better thread-safe implementation
- Testing other network protocols
- Integration with NetJack / JackTrip

Acknowledgements

The authors would like to thank the support of the funding agencies CNPq and FAPESP - São Paulo Research Foundation (grant 2008/08623-8).

Thanks!

http://sourceforge.net/projects/medusa-audionet/
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Questions?

Thanks!


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