Project supported by CAPES and FAPESP, Brazil

http://gsd.ime.usp.br/andante

MOBILE**MUSICAL**AGENTS - THE **ANDANTE** PROJECT

Leo Kazuhiro Ueda
lku@ime.usp.br
Fabio Kon
kon@ime.usp.br

Department of Computer Science
University of São Paulo, Brazil

Mobile Musical Agents - The Andante Project

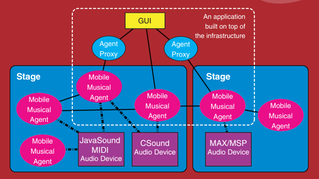
http://gsd.ime.usp.br/andante

* Introduction

- Composers always looking for new forms of music composition and performance
- Mobile Agents -> Mobile Musical Agents
- Goals:
  - Build an infrastructure for the development of musical applications using mobile agents
  - Create such applications
  - Attract the interest of both musicians and scientists

* Mobile Musical Agent

- Mobile agent: autonomous computer program capable of migrating from one machine to another
- Mobile musical agent: mobile agent that participates in the production of distributed music
- Agents get together in network nodes to make music
  - analog to musicians getting together on a stage to make music
- Each agent can perform one or more of the following actions:
  - Encapsulate a composition algorithm
  - Interact with other agents and/or real musicians
  - React to sensors
  - Migrate to another stage



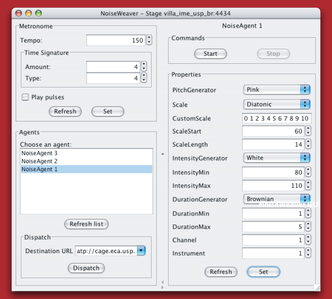
Architectural overview

* The Andante Infrastructure

- Open-source infrastructure to build and run applications based on mobile musical agents
- Intended to run on different OSes (Linux, Mac OS, Windows)
- Create community where composers and programmers collaborate to develop the system.
- Code available under the GPL
- Main technologies used:
  - Java
  - CORBA
  - Aglets (mobile agent support for Java)
  - MIDI (Java Sound API)
  - MAX/MSP

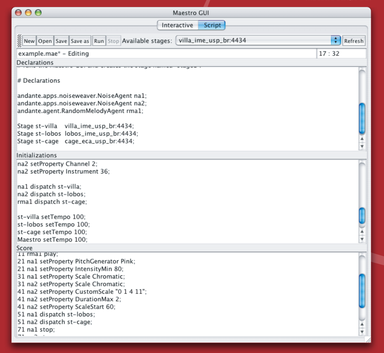
* Applications

- **NoiseWeaver**
  - Generates and plays stochastic music in real-time
  - One kind of agent: NoiseAgent, generates a stochastic melody in real-time
  - Parameters determine the way the melody is generated
  - GUI controls parameters
  - Metronome synchronizes agents on a stage



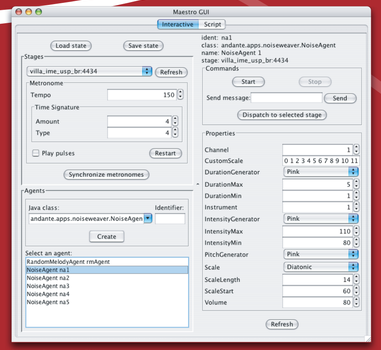
- **Maestro**
  - Allows a distributed collection of agents to be controlled by a script
  - Script gives time-stamped commands to agents
  - Can send commands to any kind of Andante agent (via Java Reflection API)
  - GUI to edit and run scripts
  - Generic GUI to control agents interactively (similar to NoiseWeaver GUI)

Maestro script GUI



Maestro script

```
# "Estudo I" by Wilson Cerqueira Ferreira

andante.apps.noiseweaver.NoiseAgent flute1;
andante.apps.noiseweaver.NoiseAgent flute2;

Stage s1 villa_ime_usp_br:4434;
Stage s2 lobos_ime_usp_br:4434;

...
flute1 setProperty Channel "1";
flute1 setProperty CustomScale "0 1 2 3 4 5 6 7 8 9 10 11";
flute1 setProperty DurationGenerator "Pink";
flute1 setProperty DurationMax "5";
flute1 setProperty DurationMin "1";
flute1 setProperty Instrument "73";
flute1 setProperty IntensityGenerator "Pink";
flute1 setProperty IntensityMax "80";
flute1 setProperty IntensityMin "80";
flute1 setProperty Pan "30";
flute1 setProperty PitchGenerator "Pink";
flute1 setProperty Reverb "0";
flute1 setProperty Scale "Pentatonic";
flute1 setProperty ScaleLength "7";
flute1 setProperty ScaleStart "67";
flute1 setProperty Volume "80";
flute2 setProperty Channel "2";
flute2 setProperty CustomScale "0 1 2 3 4 5 6 7 8 9 10 11";
flute2 setProperty DurationGenerator "Pink";
flute2 setProperty DurationMax "5";
flute2 setProperty DurationMin "1";
flute2 setProperty Instrument "73";
flute2 setProperty IntensityGenerator "Constant";
flute2 setProperty IntensityMax "110";
flute2 setProperty IntensityMin "80";
flute2 setProperty Pan "107";
flute2 setProperty PitchGenerator "Pink";
flute2 setProperty Reverb "0";
flute2 setProperty Scale "Pentatonic";
flute2 setProperty ScaleLength "6";
flute2 setProperty ScaleStart "72";
flute2 setProperty Volume "80";

flute1 dispatch s1;
flute2 dispatch s2;

...
1 flute1 play;
17 flute1 stop;
24 flute2 play;
35 flute2 stop;
38 flute1 play;
55 flute1 stop;
56 flute2 play;
63 flute2 stop;
65 flute2 play;
65 flute1 play;
147 flute1 setProperty Volume "50";
147 flute2 setProperty Volume "50";
151 flute1 setProperty Volume "20";
151 flute1 setProperty Volume "20";
181 flute1 dispatch s2;
181 flute2 dispatch s1;
215 flute1 setProperty Volume "70";
215 flute1 setProperty Volume "70";
215 flute1 setProperty DurationMax "24";
215 flute1 setProperty DurationMin "24";
215 flute2 setProperty DurationMax "24";
215 flute2 setProperty DurationMin "24";
225 flute1 stop;
225 flute2 stop;
...
```



Maestro interactive GUI

* Unresolved Issues

- Quality of Service
- Work on other sound technologies: MAX/MSP, jMax, Siren, CSound, jMusic
- New applications, moving focus to music creation

* For more information

- Papers:
  - Andante: Composition and Performance with Mobile Musical Agents. Leo Kazuhiro Ueda and Fabio Kon. In *Proceedings of the International Computer Music Conference 2004*, Miami, November 2004.
  - Andante: A Mobile Musical Agents Infrastructure. Leo Kazuhiro Ueda and Fabio Kon. In *Proceedings of the IX Brazilian Symposium on Computer Music*, pages 87-94, Campinas, Brazil, August 2003.
- http://gsd.ime.usp.br/andante
- Contact: Leo Ueda <lku@ime.usp.br>, Fabio Kon <kon@ime.usp.br>
- Join us: the Andante project is seeking the help of musicians and software developers. There is a lot to be done!