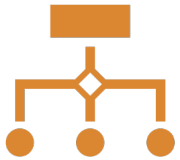
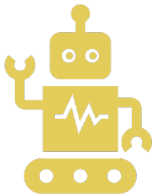
VISUAL PROGRAMMING: MAXMSP

AIST2010 Lecture 10P



Visual Programming



Max

MSP

Audio techniques in MaxMSP

OUTLINE

VISUAL PROGRAMMING

"Dataflow programming"/"Diagrammatic programming"

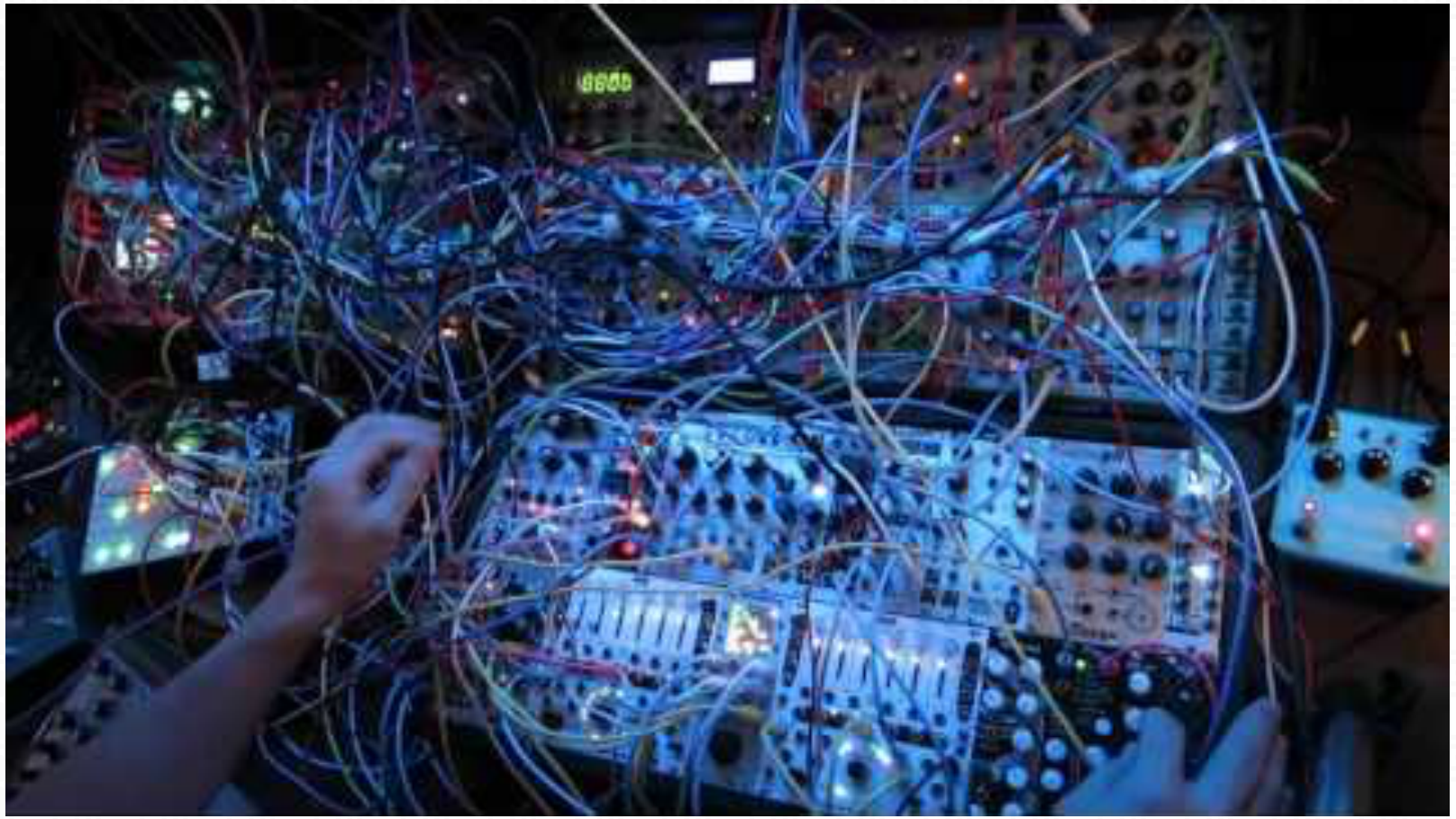
- Graphical representation of objects with boxes and arrows

Max

- **Real-time interactive** synthesis and processing of sound and music
- Started in 1985 by Miller Puckette at IRCAM
- Continued as **Max/MSP** by Cycling '74
  - Miller Puckette independently released **Pure Data** as an ***open-source alternative*** in 1996
- Jitter: a video component

AUDIO PATCHING?

Video from: https://youtu.be/o791hgNvGIg



MAX

A standard Max file: Max patcher

- **Object**: commands/functions
  - Inlets and outlets
- **Message**: variables
- **Comment**: as you can expect from programming languages!
- **Patch cords**

- **Number boxes**: displaying values
- **UI objects/messages**: buttons, toggles, sliders, etc.

HOW DO THEY CONNECT?

Max patch cord
(*control rate*)

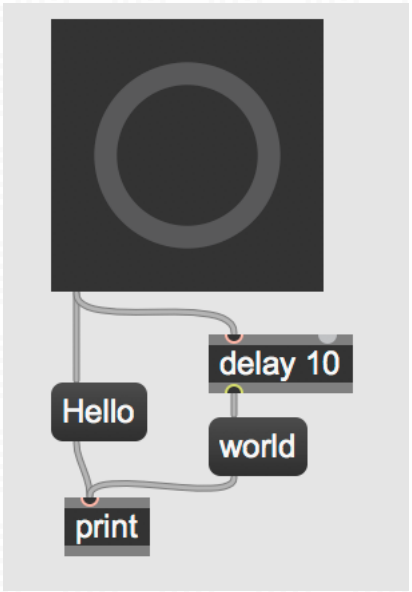
MSP patch cord
(*audio rate*)

A message

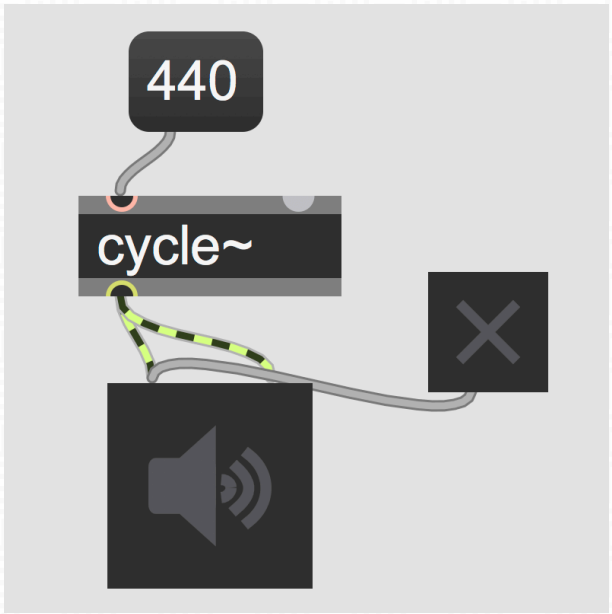
An oscillator object

A dac object

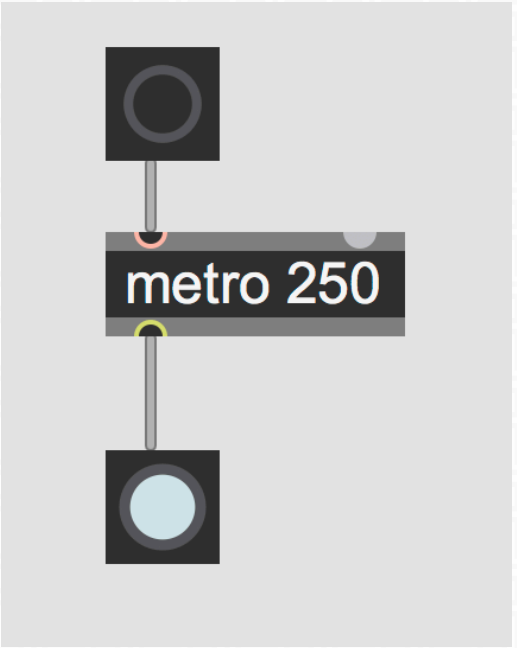
BANG, TOGGLE, AND METRO



Bang
Start the action!



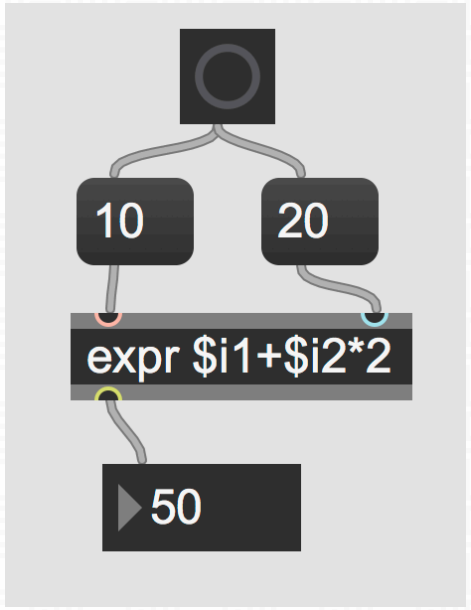
Toggle
On or off



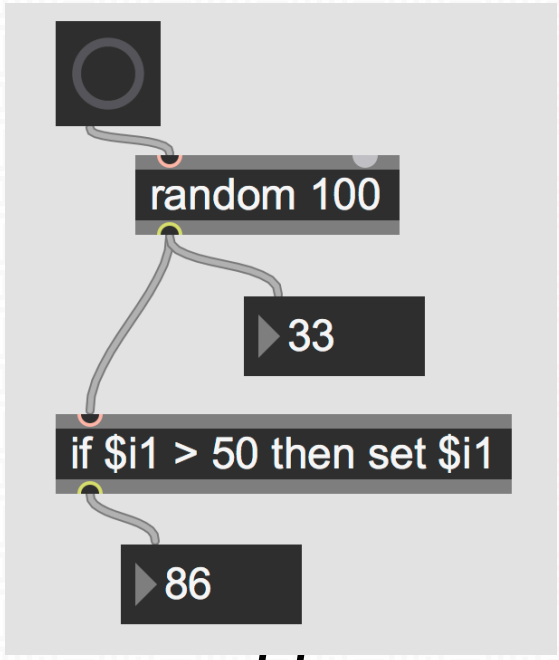
metro
Repeated bang

ARITHMETIC AND CONDITIONAL OPERATORS

- +
- -
- *
- /
- %



- !=
- <
- <=
- ==
- >
- >=



expr *object for complex calculations*

sel *object for easy equality choice*

if *object for complex decisions*

MSP: MAX SIGNAL PROCESSING

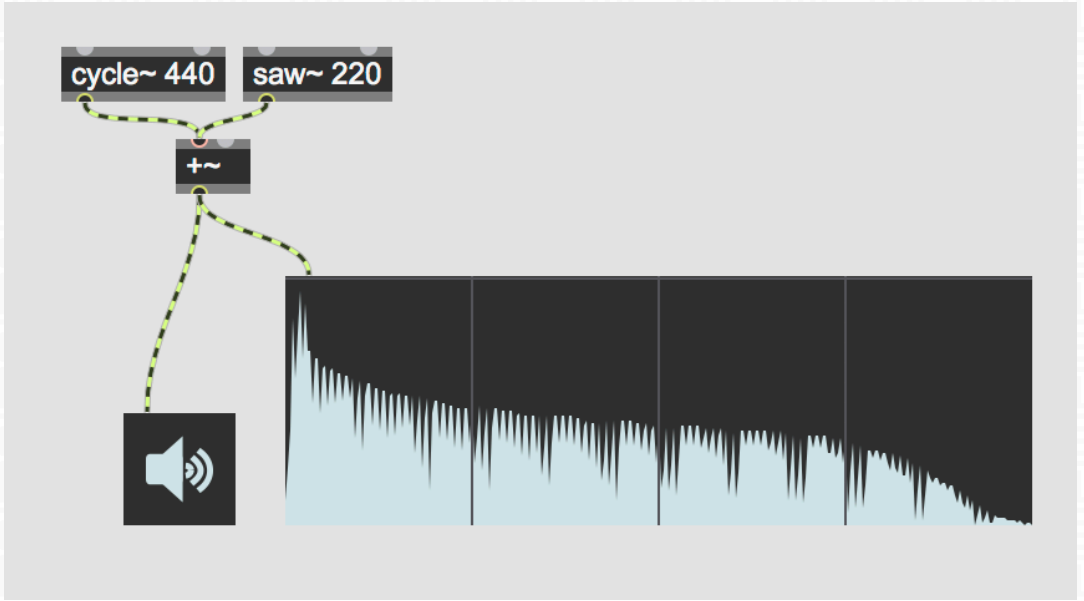
Oscillators

- `cycle~`
- `phasor~`
- `rect~`
- `saw~`
- `tri~`

Signal analysis

- `scope~`
- `spectroscope~`
- `fft~`
- `ifft~`

Arithmetic: `+~ -~ *~ /~`



LINE, NOISE, FILTERS, AND EFFECTS

Line generator

- **line~**
  - Format: x1, x2 t1 x3 t2 …

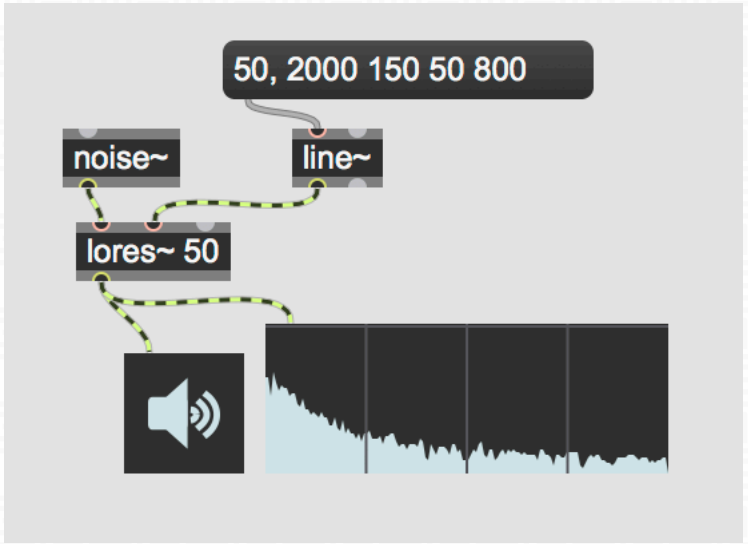
Noises

- **noise~**
- **pink~**
- **rand~**

Filters

- **lores~**
- **reson~**

Many other effects available too!



MIDI OUTPUT

MIDI note generation

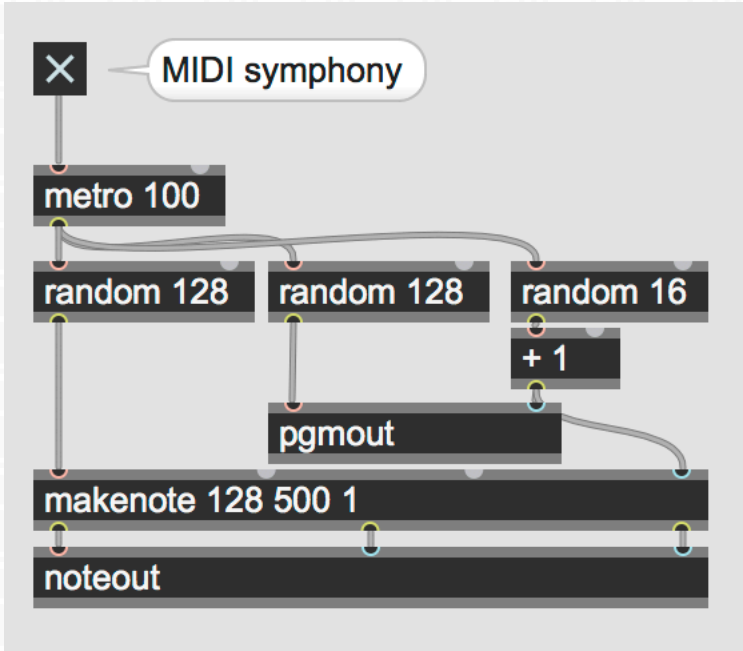
- **makenote**
- **noteout**

Program change (different instruments)

- **pgmout**

Other controls

- **bendout**, **ctlout**, **touchout**, …



ACCESSING KEYS AND CURSOR

Key press

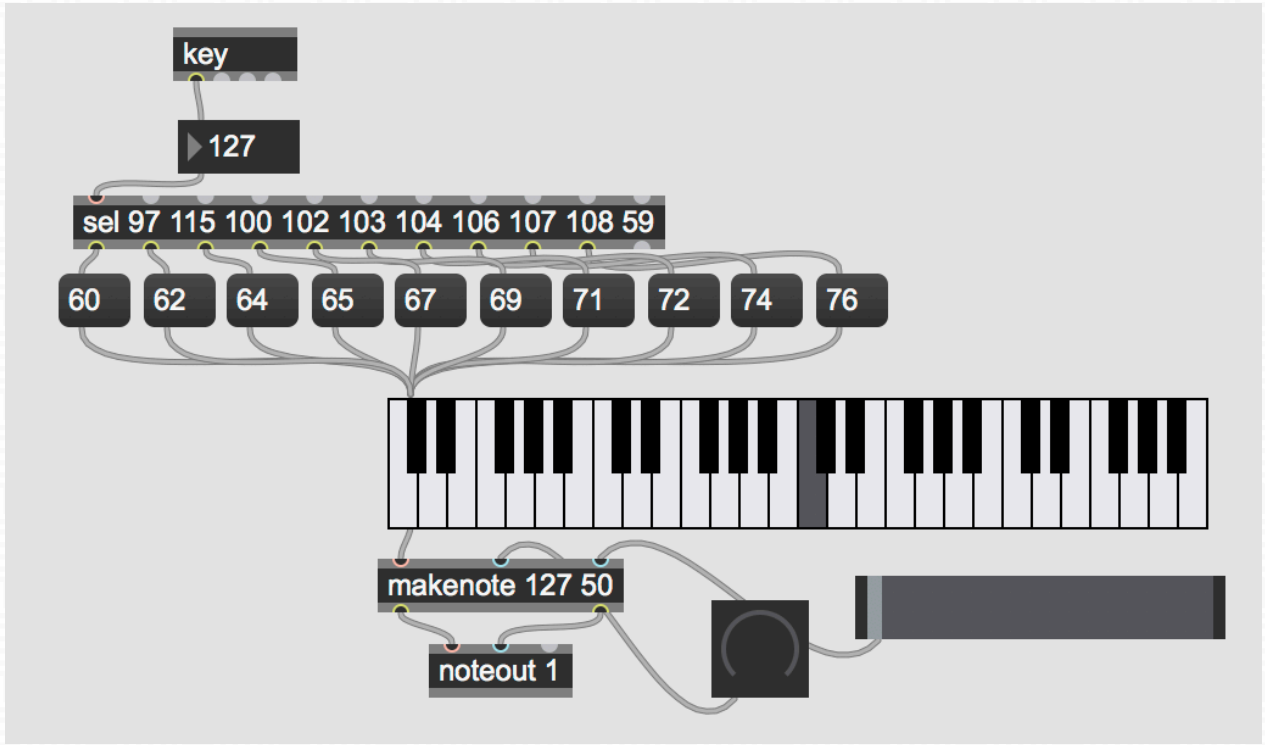
- **key**
- **keyup**

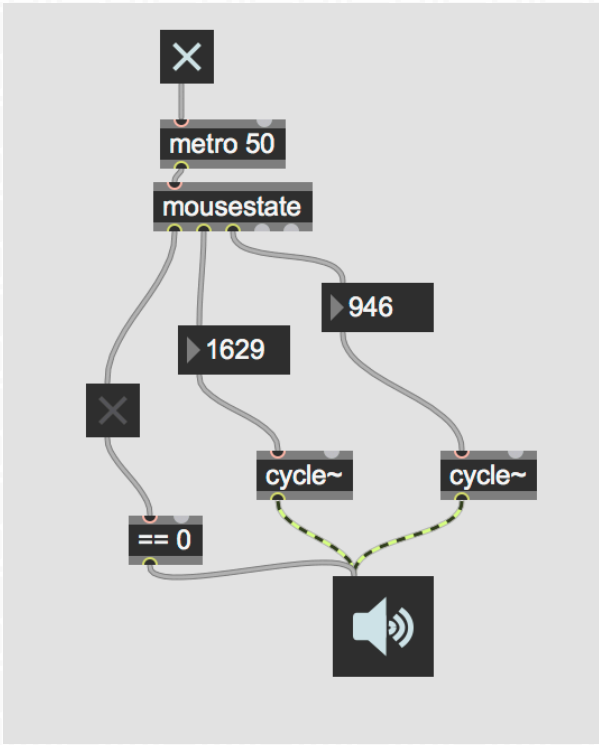
Special keys

- **modifiers**

Cursor

- **mousestate**
  (activated by bang)





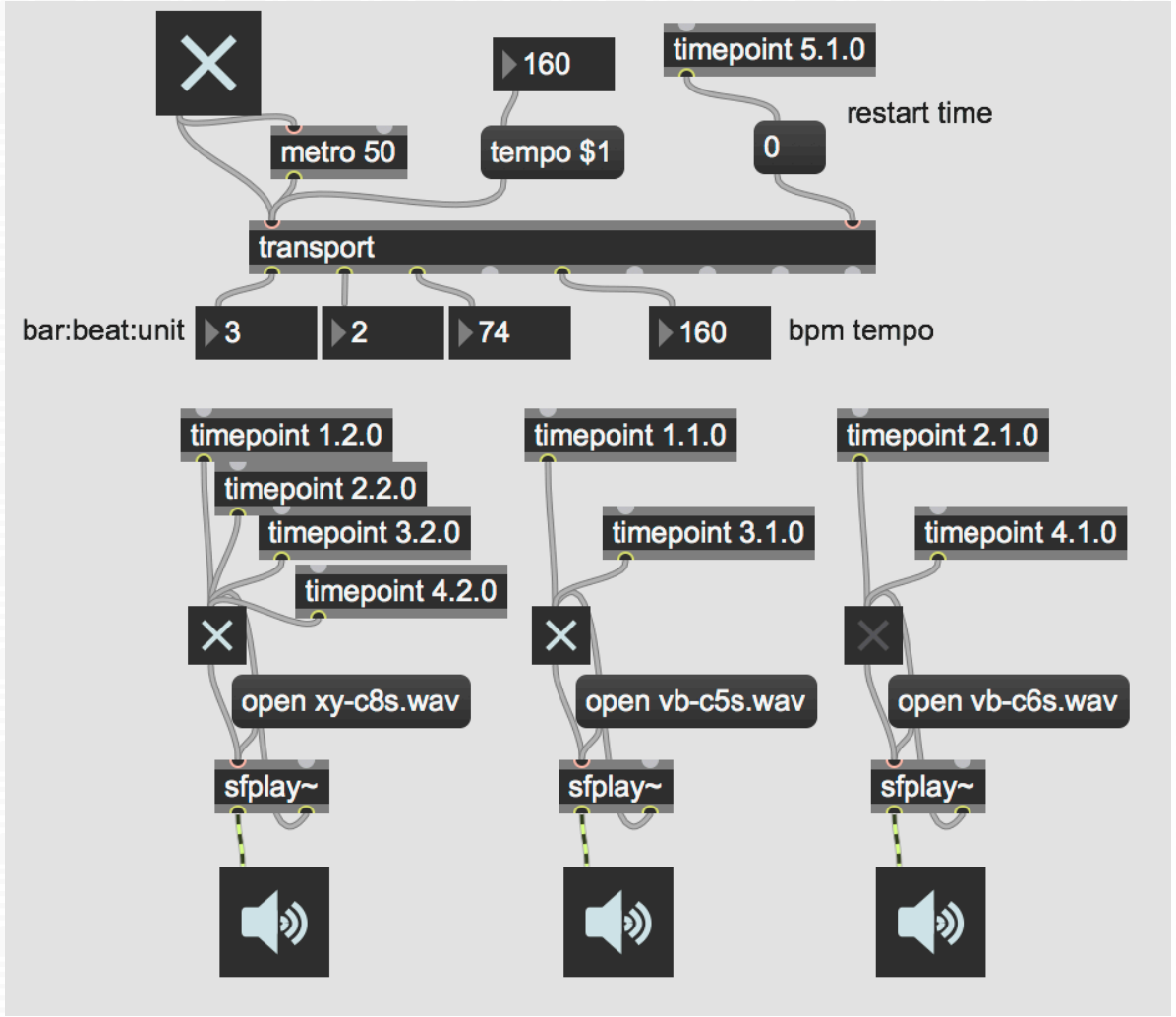
AUDIO FILES AND TIMING

Audio file playback (wave, mp3)

- **sfplay~**
- **buffer~** and **play~**

A global timer

- **transport**
  - Counting in bar:beat:unit
- **timepoint**



SPECIAL CONTROLS FOR PATCHES

A subpatch inside a patch

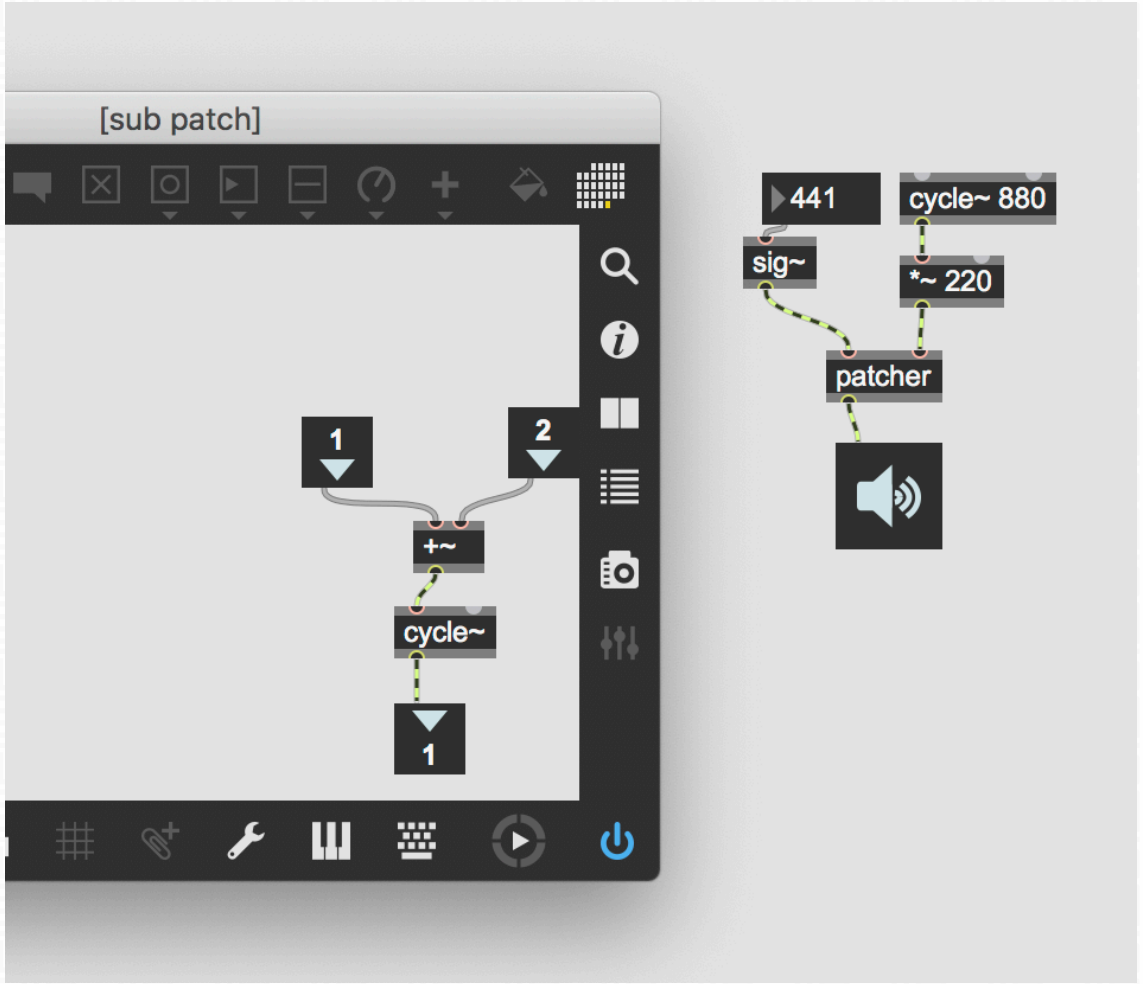
- **`patcher`** – contents hidden
- **`bpatcher`** – contents shown
- **`inlet`**, **`outlet`**

Bang when patch is loaded

- **`loadbang`**

Bang when patch is closed

- **`closebang`**



PUREDATA AND MOBMUPLAT

PureData is an open-source alternative for MaxMSP

- Most of the objects are almost equilvalent
- Operation is similar

MobMuPlat

- A pd environment on mobile devices
- Easily incorporate sensors and other features on device for audio control
  - E.g. tilt for filter cut-off, multitouch for frequencies

MUSIC FROM ENVIRONMENT SOUNDS

Video from: https://youtu.be/k95pB0jr5Cc

LECTURE REVIEW

We have discussed:

- Visual programming
- Max basics
- MSP: Max Signal Processing
- Audio techniques in MaxMSP
- PureData and MobMuPlat

READ FURTHER

*Chapter 1 "Introduction to Programming", **Max/MSP/Jitter for Music***

*Chapter 2 "Generating Music", **Max/MSP/Jitter for Music***

Useful websites:

- *https://docs.cycling74.com/max8*
- *http://write.flossmanuals.net/pure-data*