SCHOOL OF MUSIC, THEATRE & DANCE
PERFORMING ARTS TECHNOLOGY
UNIVERSITY OF MICHIGAN

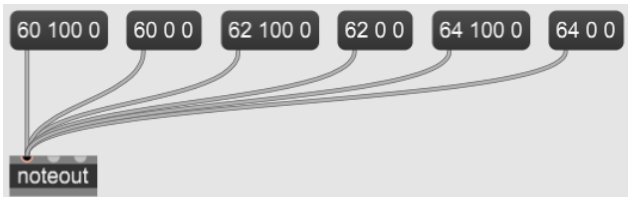
Creative Coding (PAT 204/504, Fall 2024)

Lecture 15 – Max/MSP Basics

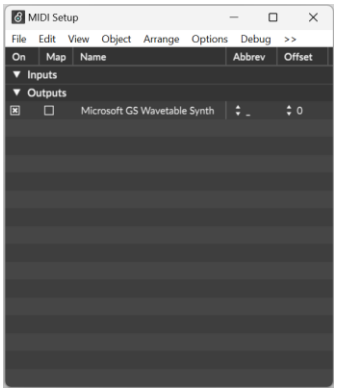
Instructor: Hao-Wen Dong

Example 1: MIDI player ("1_midi_player.maxpat")

- "noteout" object

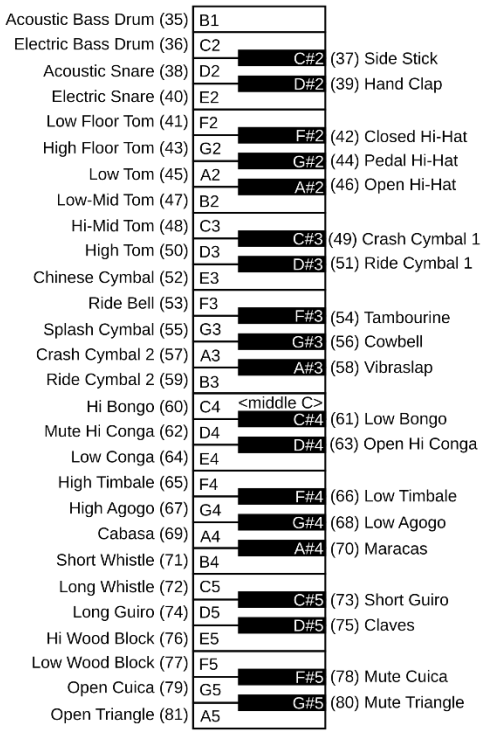


- MIDI setup ("Options >> MIDI Setup")



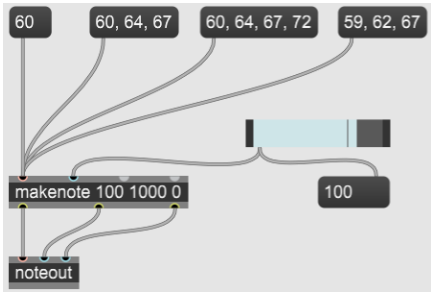
- Note-on/note-off MIDI messages
  - "60 100 0" → pitch 60 (middle C), velocity 100, channel 0 → Note-on
  - "60 0 0" → pitch 60 (middle C), velocity 0, channel 0 → Note-off
- "pgmout" object → program number (en.wikipedia.org/wiki/General_MIDI)

- MIDI channel 10 for drums

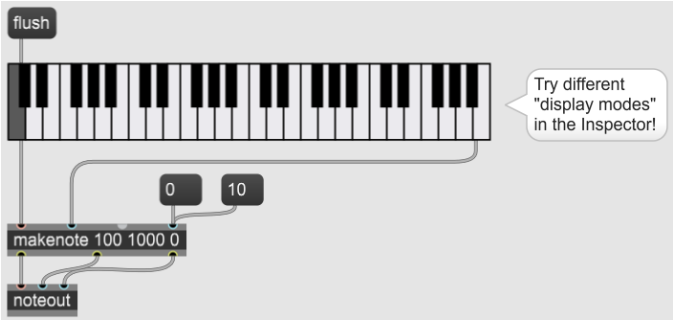


(Source: en.wikipedia.org/wiki/General_MIDI)

- "makenote" object
    - Send a pair of note-on & note-off messages

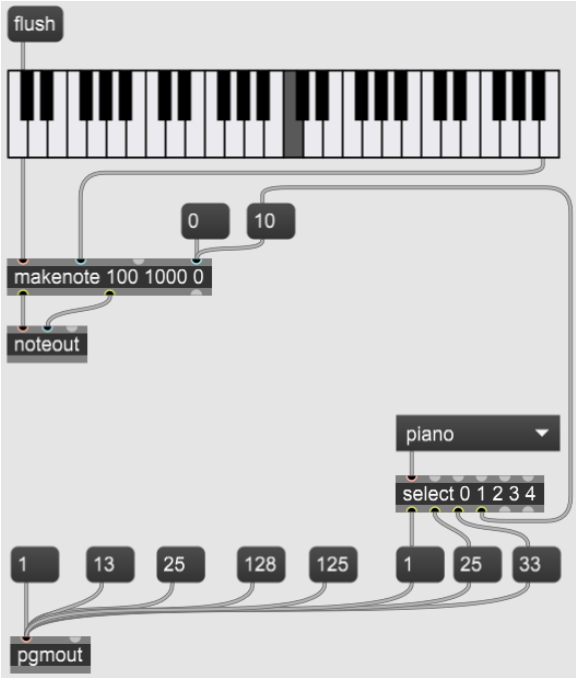


    - Why? Because it can be quite chaotic if we forgot to turn off a note
    - Play chords by sending multiple pitches!
- "kslider" object

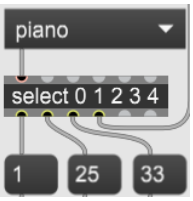


    - Display mode – monophonic vs polyphonic

    - Right click on the cord and click “Route Patch Cords” (**Ctrl-Shift-Y**) to route the chord as you wish
- Drop-down list for selecting an intrusment

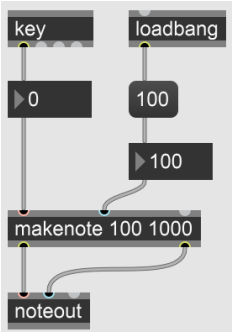


    - “umenu” object + “select” object

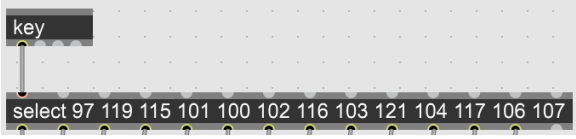


Example 2: MIDI keyboard (“2_midi_keyboard.maxpat”)

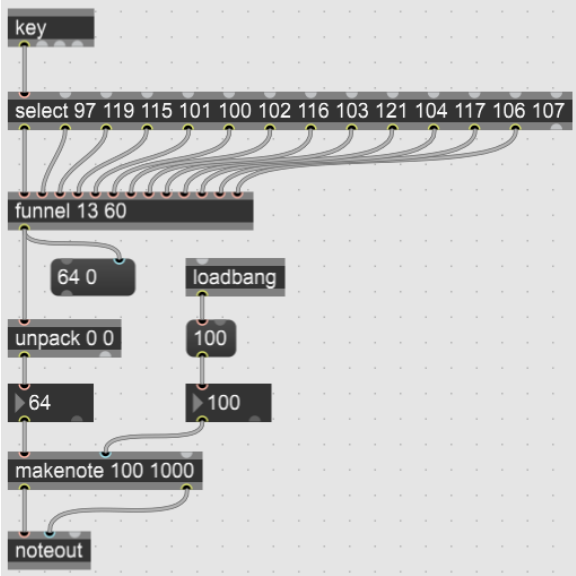
- “key” object



- “select” object

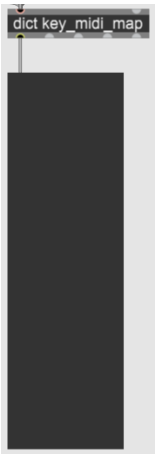


- “funnel” object

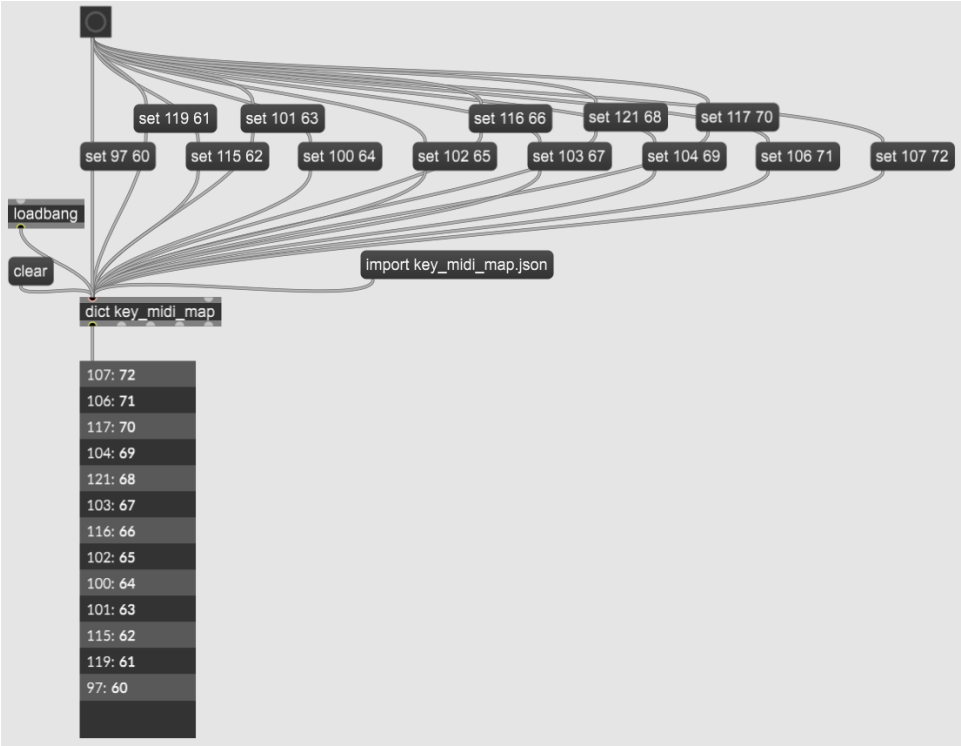


- "unpack” object
- “dict” object
    - bang message
    - set message
    - clear message

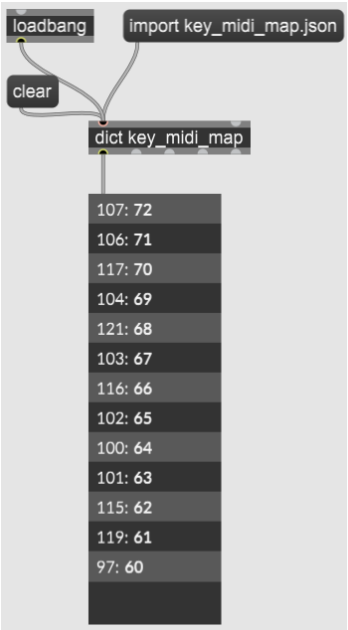
- “dict.view” object



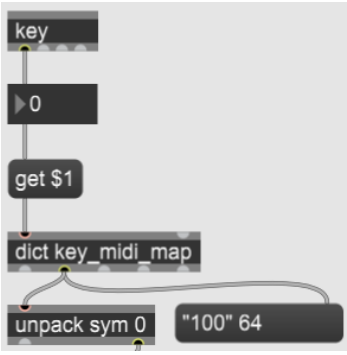
- Use a bang message to set up the key-value pairs



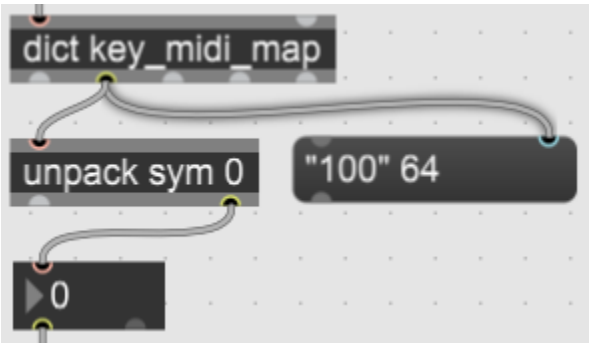
- “import” message to load from JSON



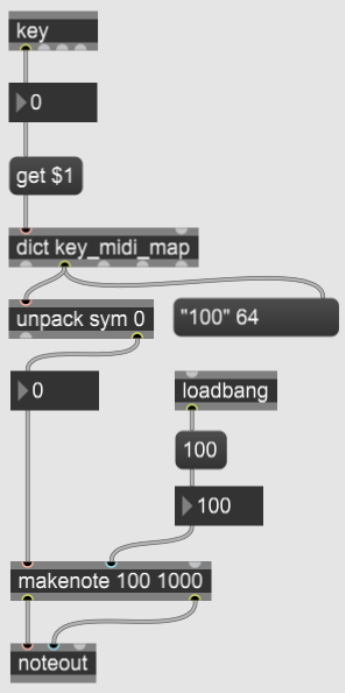
- “get” message – $ sign syntax



- “unpack” object

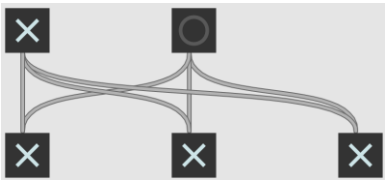


- Connecting everything together

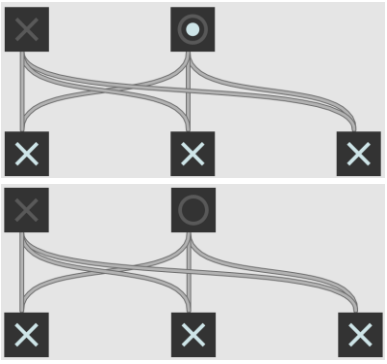


Example 3: Polyrhythm (“polyrhythm.maxpat”)

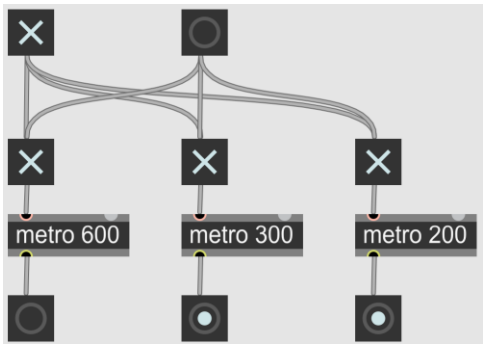
- Toggles & buttons
  - A toggle maintains the state



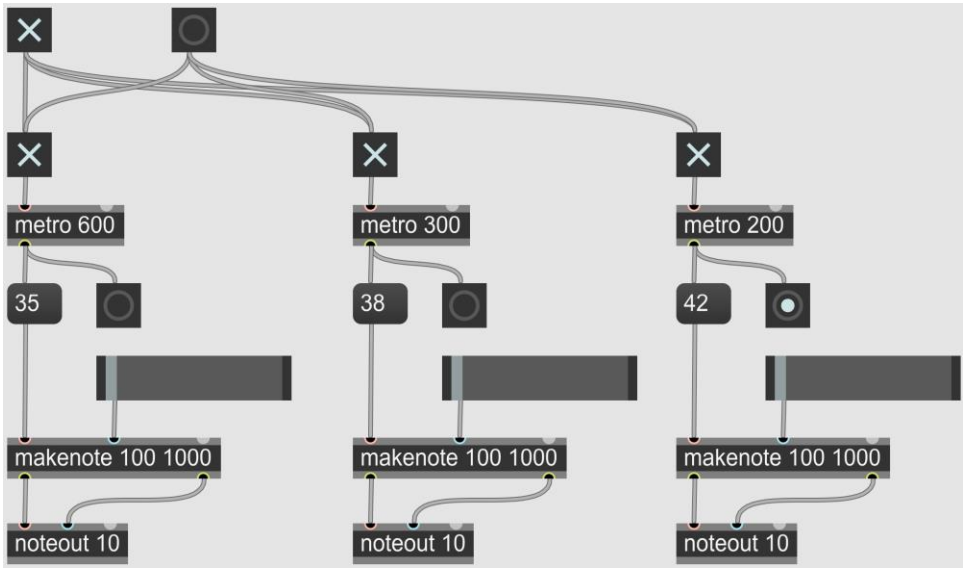
  - A button sends out a one-off bang message



- “metro” objects



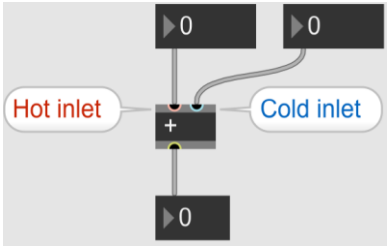
- Polyrhythm!



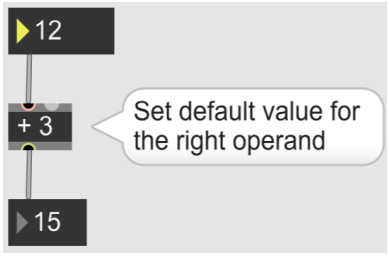
(Note that “noteout 10” set the default MIDI channel to 10)

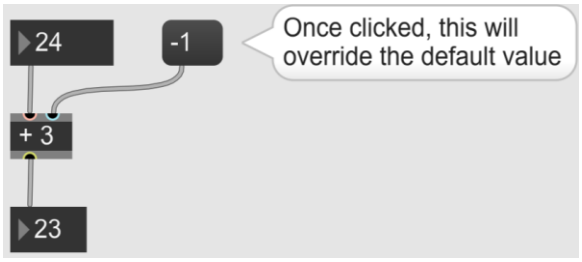
Example 4: Math (“math.maxpat”)

- Hot inlet vs cold inlet

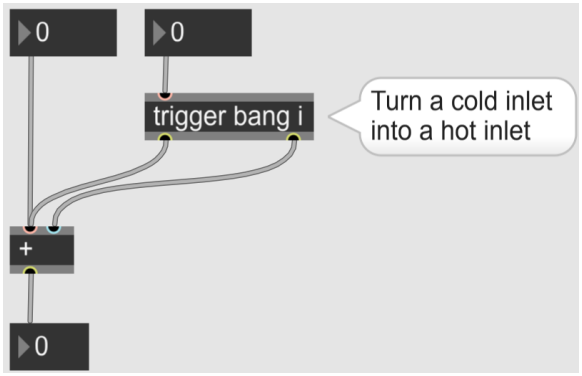


- Set default value (acts like the “+=” operand)



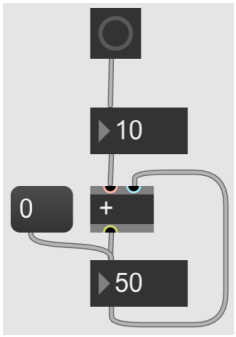


- Use “trigger” object to turn a cold inlet into a hot inlet

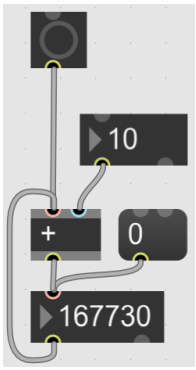


  - Shorthand

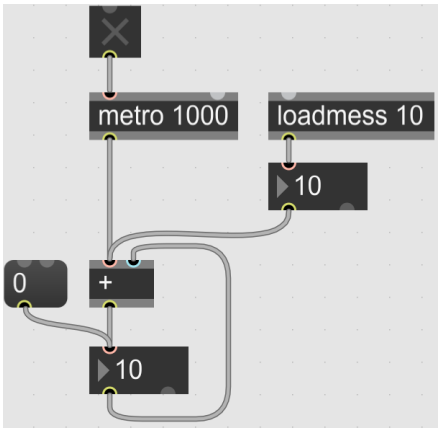
- A simple counter



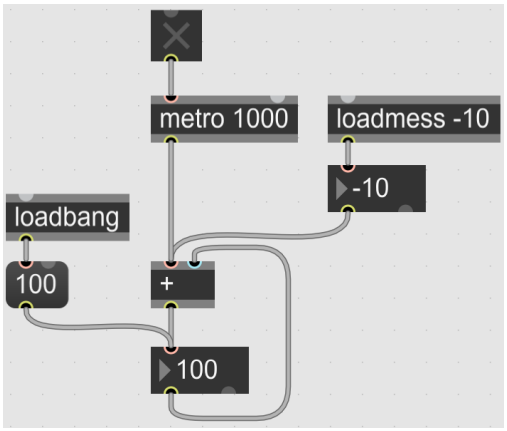
- What if? ...stack overflow!



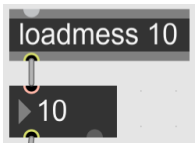
- An automatic counter



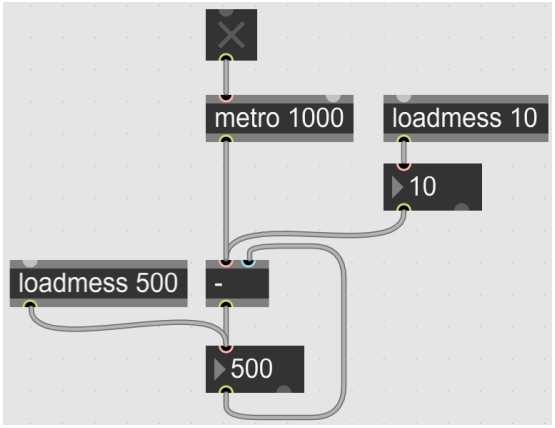
An automatic timer



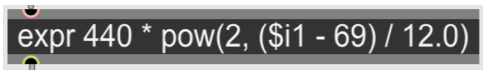
- Use a “loadmess” object to send a message at load time



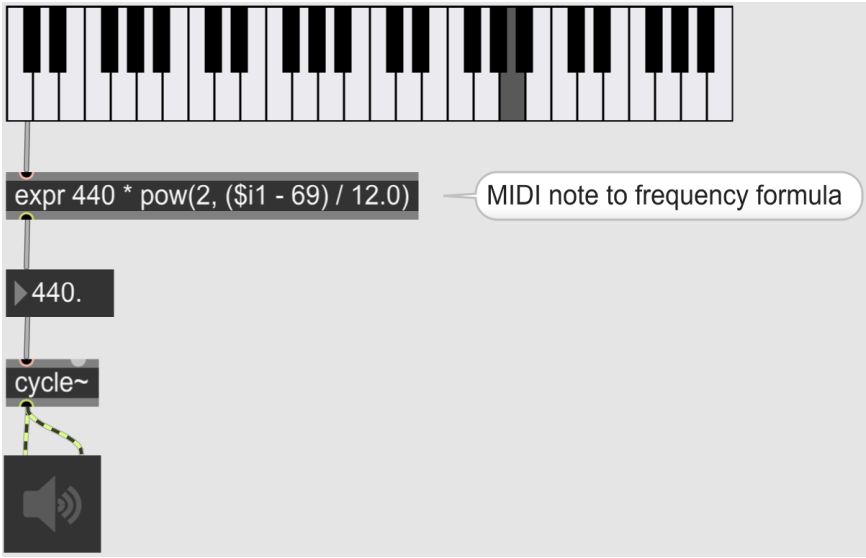
- What if?



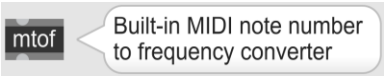
- Use the “expr” object for math expressions



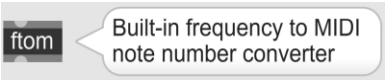
- A simple sinusoid synthesizer



- Use “mtof” to convert MIDI note number to frequency

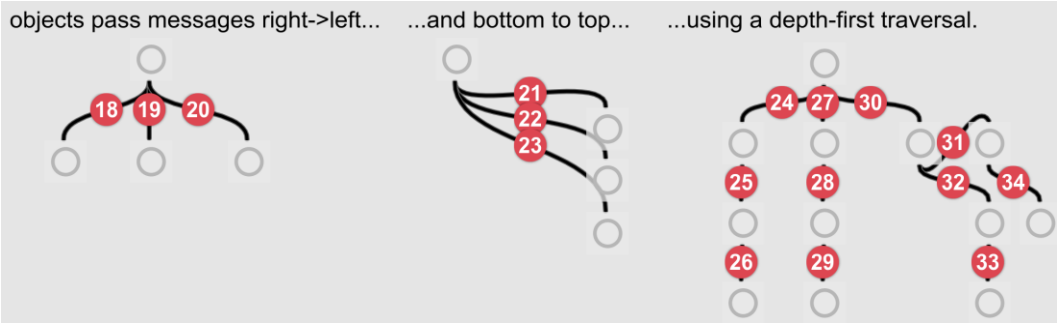


- Use “ftom” to convert frequency to MIDI note number

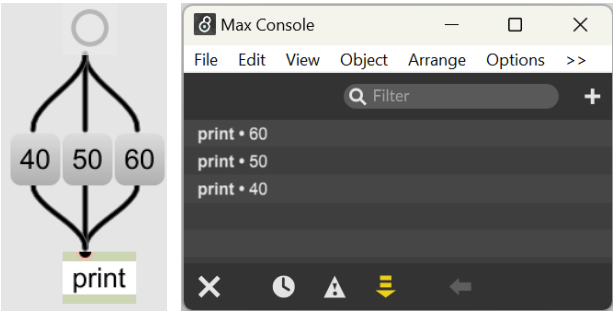


Example 5: Message Ordering (“5_message_ordering.maxpat”)

- Right-to-left, bottom-to-top!

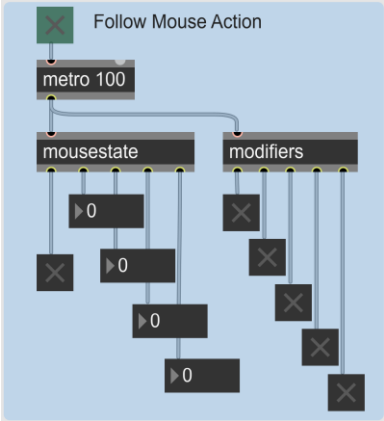


- Right-to-left, as shown in the Max console!

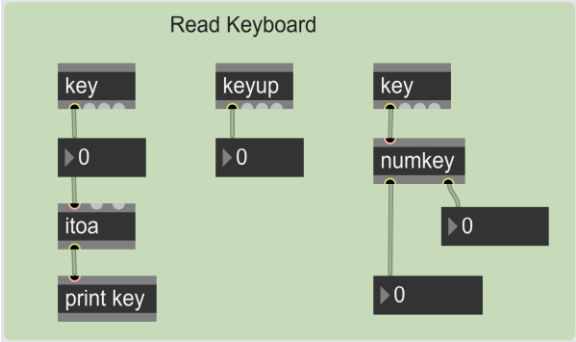


Example 6: Mouse and Keyboard Controls ("6_08mKeyboardAndMouseInput.maxpat")

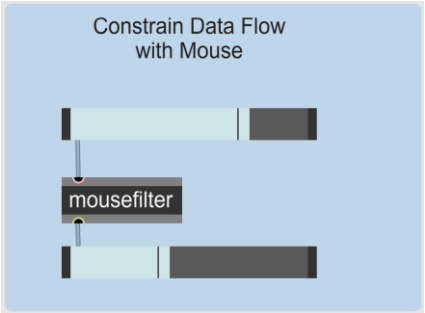
- Use the "mousestate" object to get the "left click", "x-position", "y-position", "delta-x", "delta-y"
  Use the "modifiers" object to get the "Shift", "Caps Lock", "Opt/Alt", "right click", "Cmd/Ctrl"



- Use "key" and "keyup" objects to read the keyboard inputs



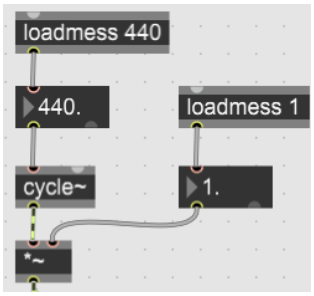
  - Use "itoa" object to convert an integer to its corresponding ASCII character
  - Use "numkey" to handle numerical inputs → hit enter when done!
- Use the "mousefilter" object to control the data flow → the data can only pass through when the mouse is up



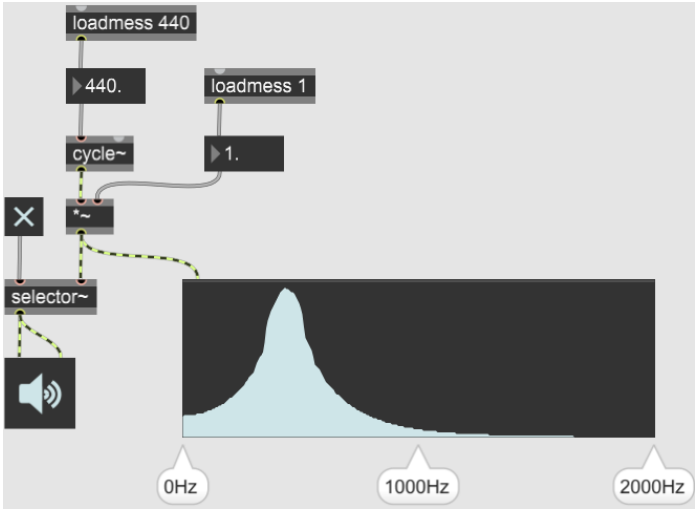
Example 7: Simple Synth (“7_simple_synth.maxpat”)

- Use the “cycle~” object to create a sinusoid oscillator

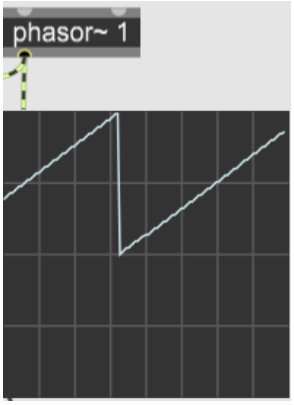
- Set the magnitude by “*~” → multiplication of signals



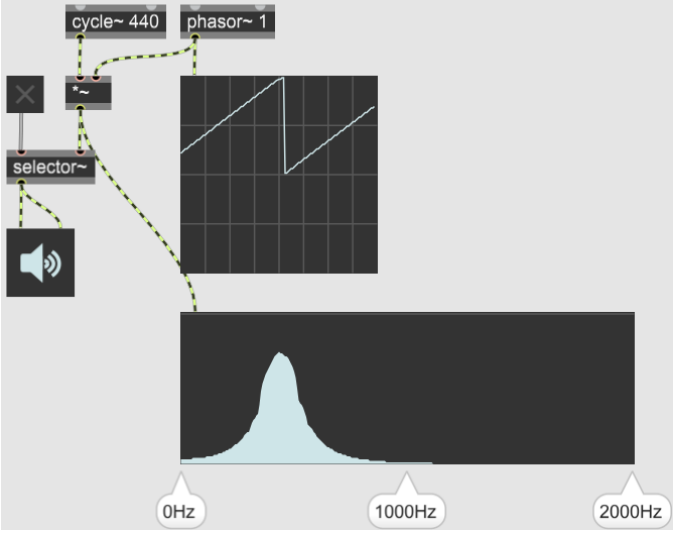
- A simple sinusoid oscillator



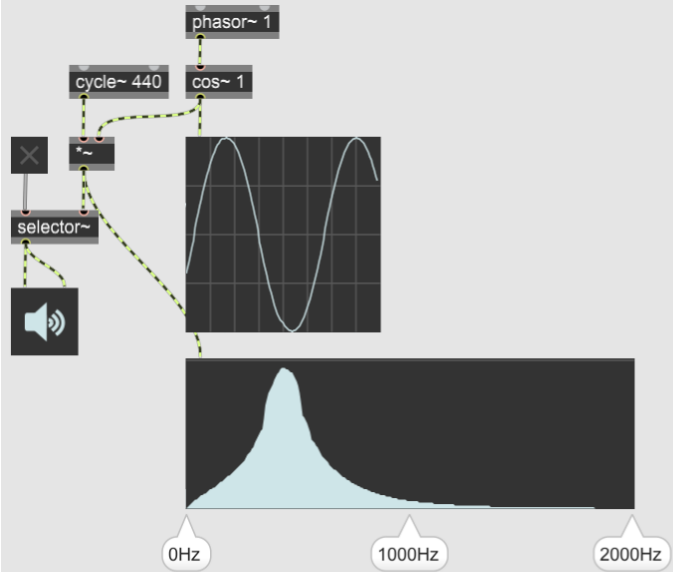
- Use the “phasor~” object to create a saw-tooth signal



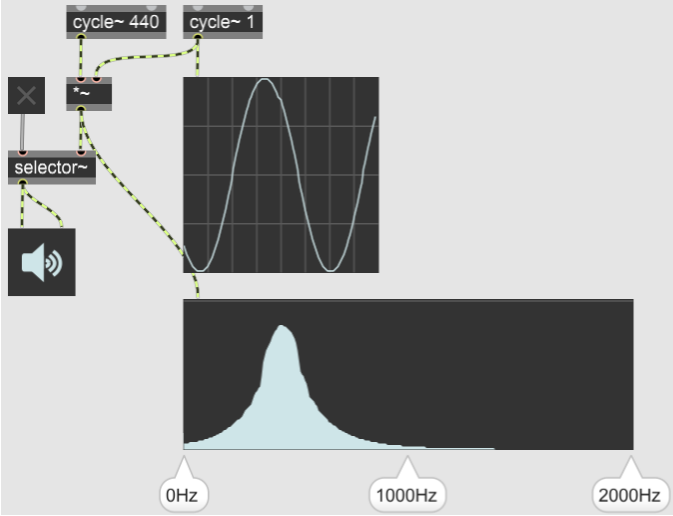
- Use the “phasor~” to control the magnitude



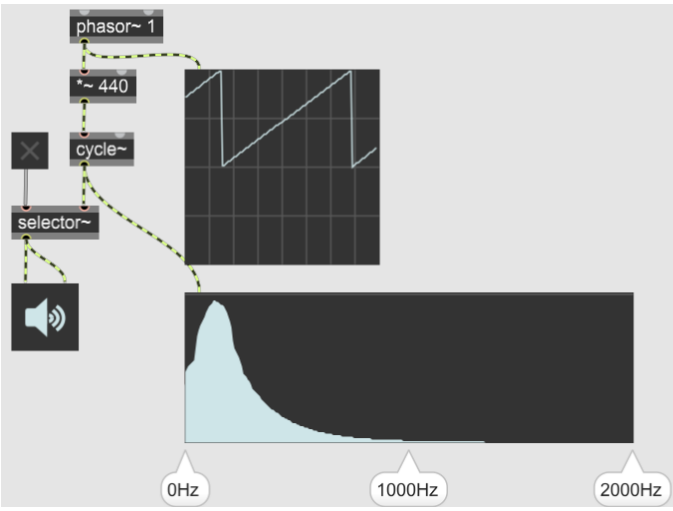
- Turn the “phasor~” object to a sinusoid wave

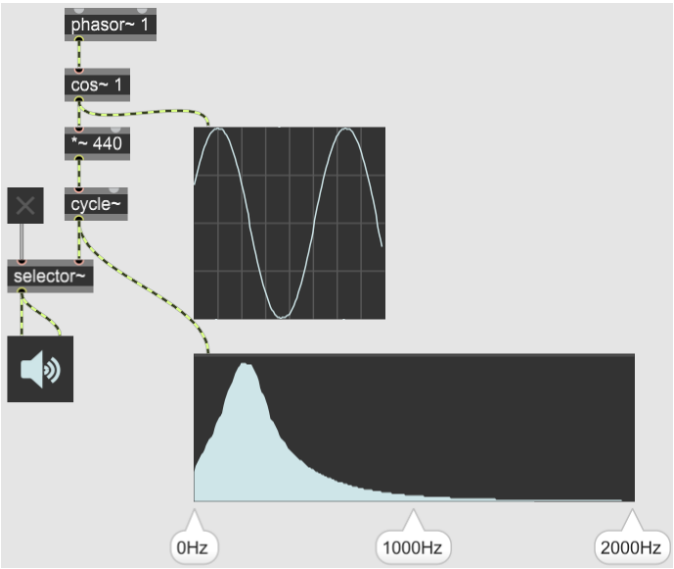


- “phasor~ 1” + “cos~” is equivalent to “cycle~ 1”

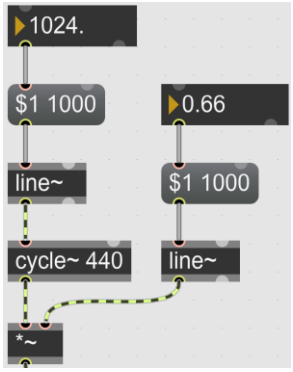


- Use “phasor~” to control the frequency of the sinusoid oscillator





- Use “line~” to create a linear ramp generator



- A sinusoid oscillator with smooth frequency and amplitude change