

>mix new beats --sup

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A close-up photograph of a blue vinyl record with a yellow center label. A silver cable is wrapped around the record's edge. The background is a light-colored wooden surface.

Amen  
Brother

**WE WILL  
PLAY THIS  
IN ELIXIR**

**WE WILL  
BUILD A  
DRUM MACHINE**

# Scheduling Patterns

SchedEx

Beats (the drum machine)

Beats (the musical construct)

# SCHEDULING PATTERNS





17:03

LAS2B

350 / 477  
SHIFT 1 (MID)

1:40 TARGET

1:53 1:42 1:23  
LAST AVERAGE BEST

1:46 1:44 1:50 1:55

39%



OEE

222 / 398  
SHIFT 2 (DAY)

86 / 504  
★ SHIFT 3 (AFT)

UNKNOWN



2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM
52	34	0	0	0	0	0	0
61	72	72	71	54	72	72	30



*Simple Time Based*  
**Scheduling**

# ...in 30s

```
iex> SchedEx.run_in(IO, :puts, ["Hello, world"], 30000)  
#=> {:ok, #PID<0.208.0>}
```

```
# 30 seconds later...  
Hello, world
```

# 10:30 every weekday

```
iex> SchedEx.run_every(IO, :puts, ["Hello, world"], "      ")          30 10 * * 1-5
#=> {:ok, #PID<0.211.0>}
```

```
# At 10:30am the next weekday...
Hello, world
```

supervisor friendly  
timezones+dst  
time scales  
repeating timers  
extended crontabs  
runtime stats

```
defmodule TimeScale do
  def speedup, do: 86400
end
```

```
SchedEx.run_every(IO, :puts, ["Hello, world"], "30 10 * * *", time_scale: TimeScale)
```

```
Process.sleep(1000)
```

```
#=> "Hello, world"
```

# time scales

**github.com/SchedEx**

**BEATS  
IS A DRUM  
MACHINE**

**[github.com/mtrudel/beats](https://github.com/mtrudel/beats)**

A screenshot of the Ableton Live 10.1.17 software interface. The top section shows a live session with tracks for various instruments like Drum Kit, Bass, and Synths. The rack below contains audio effects such as Sends, Crossover Synths, and Sidechain Pads. The bottom section shows a clip view with a timeline from 1 to 8, a piano-roll style view of notes, and a key editor with notes G3 and C3. A vertical red line at bar 1 indicates a playhead position. The interface is dark-themed with yellow highlights for selected elements.

**APC40** MKII





 Roland





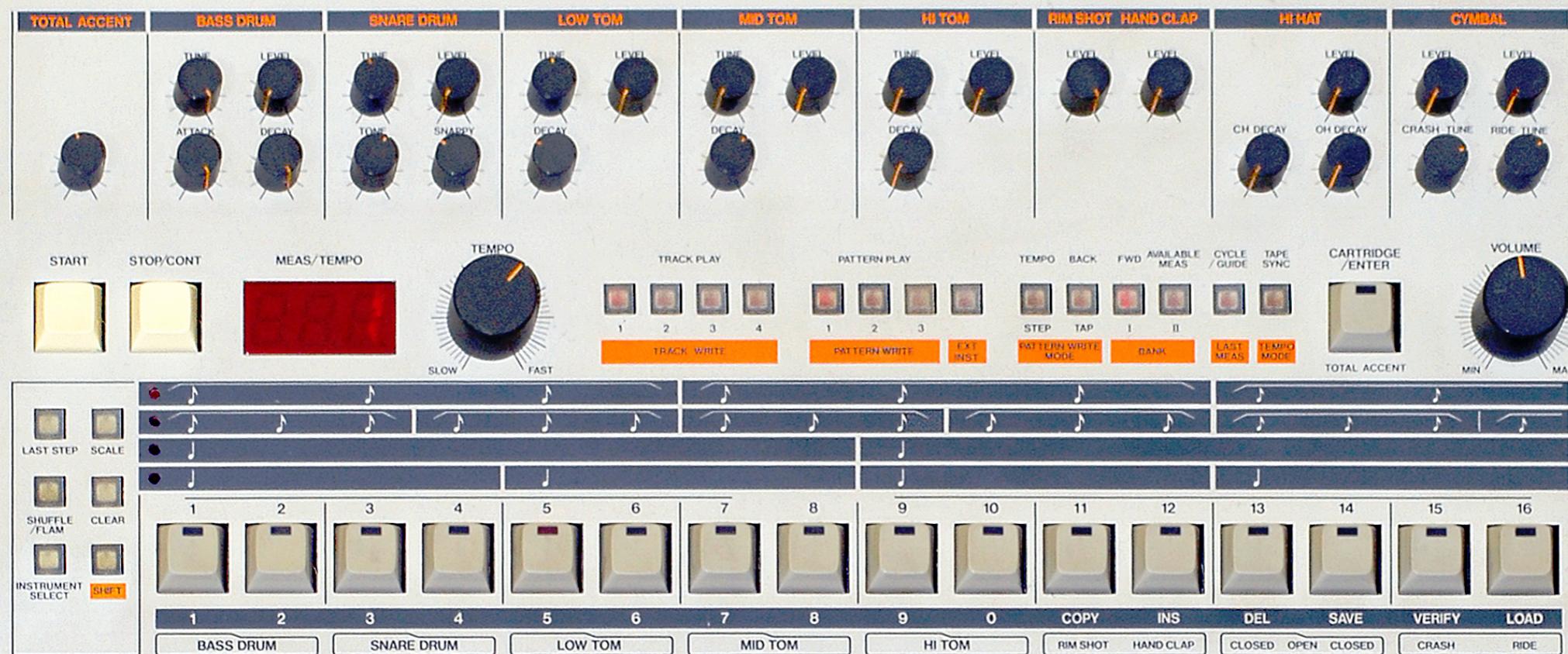
 Roland



 Roland

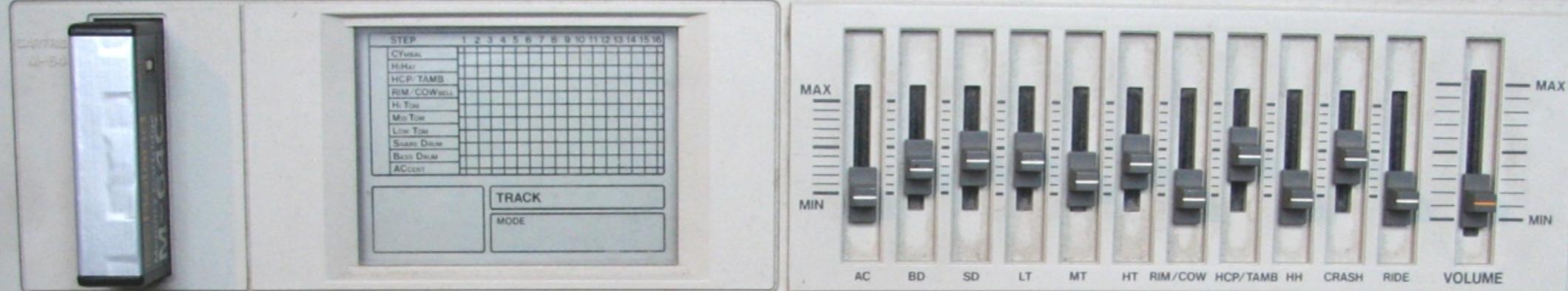
# TR-909

## RHYTHM COMPOSER



Roland

RHYTHM COMPOSER TR-707



**PATTERN**

STOP/CONT

CLEAR SCALE LAST STEP INSTRUMENT /GUIDE SHUFFLE /FLAM

CLEAR BACK FWD LAST MEAS

MIDI CH SYNC MODE TRACK STEP/TAP

TEMPO /MEAS

**PLAY**

TRACK PATTERN

**PATTERN GROUP**

A B C D

I II III IV

**ENTER** CARTRIDGE

**TEMPO**

TEMPO KNOB (SLOW to FAST)

**TRACK**

START

SHIFT

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

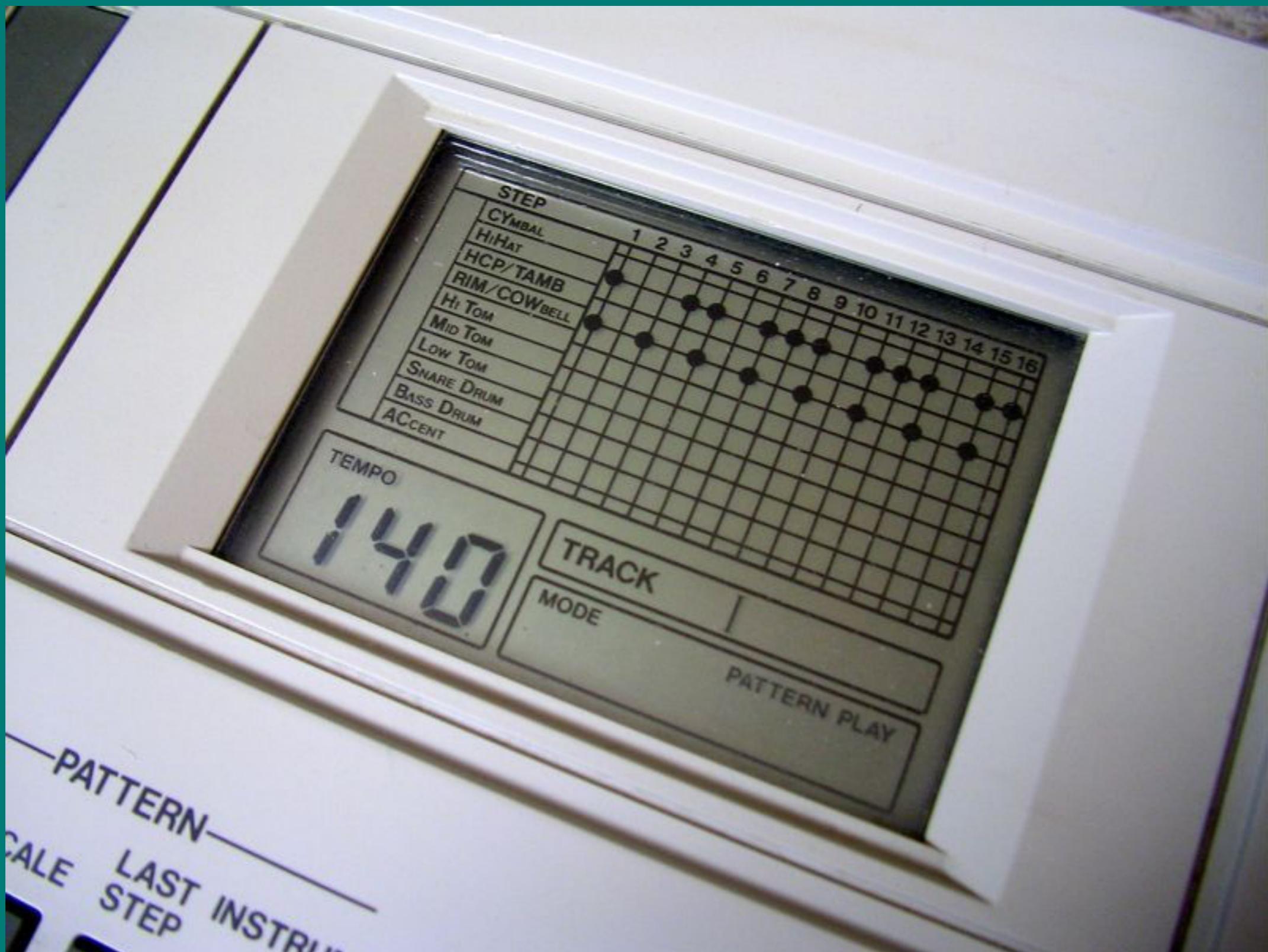
1 2 1 2

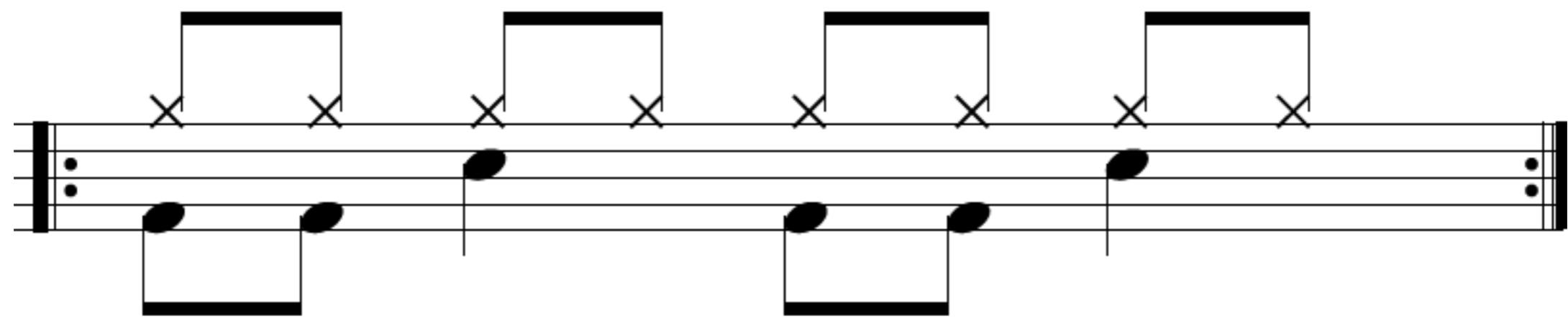
BASS DRUM SNARE DRUM LOW TOM MID TOM HI TOM RIMSHOT COWBELL HANDCLAP TAMBOURINE

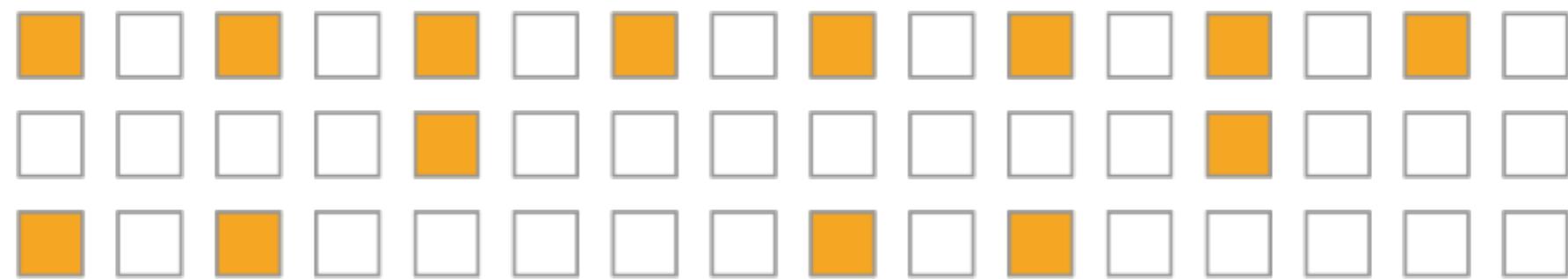
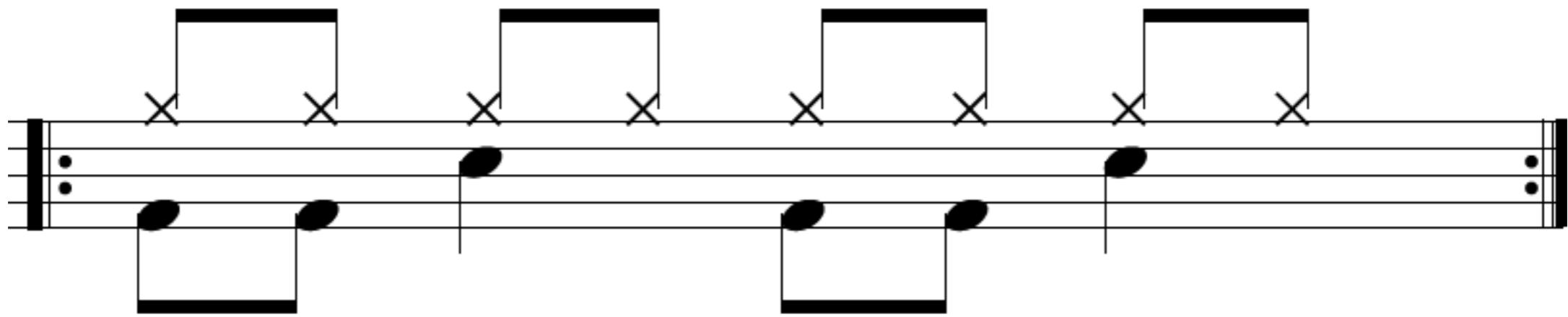
0 COPY INS DEL SAVE VERIFY LOAD

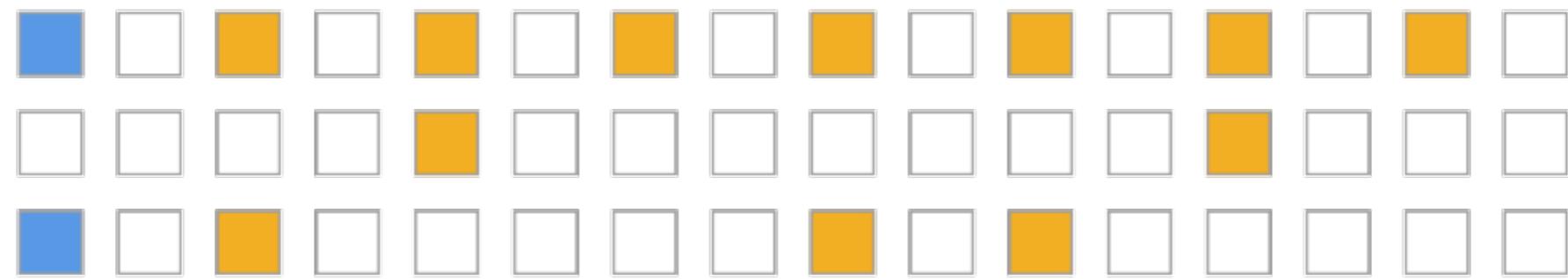
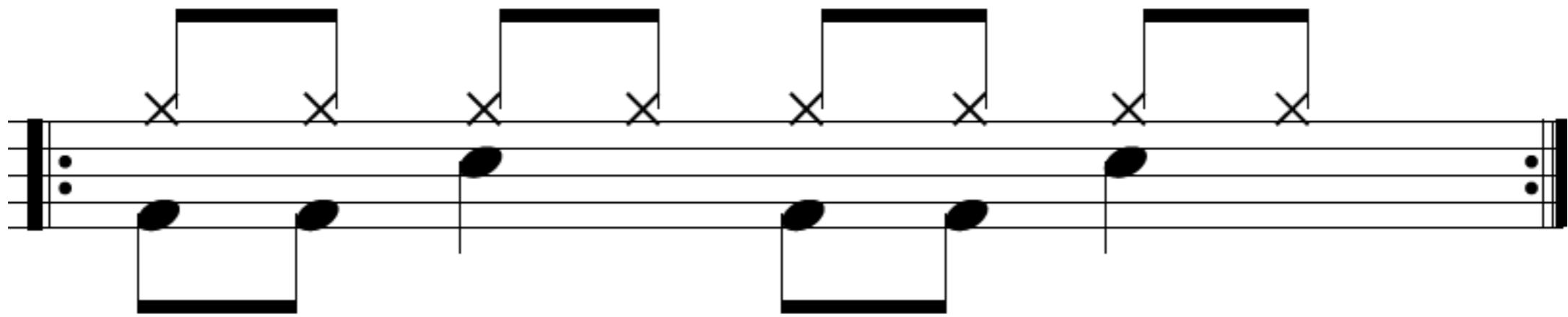
CLOSED OPEN CRASH RIDE

Hi HAT CYMBAL

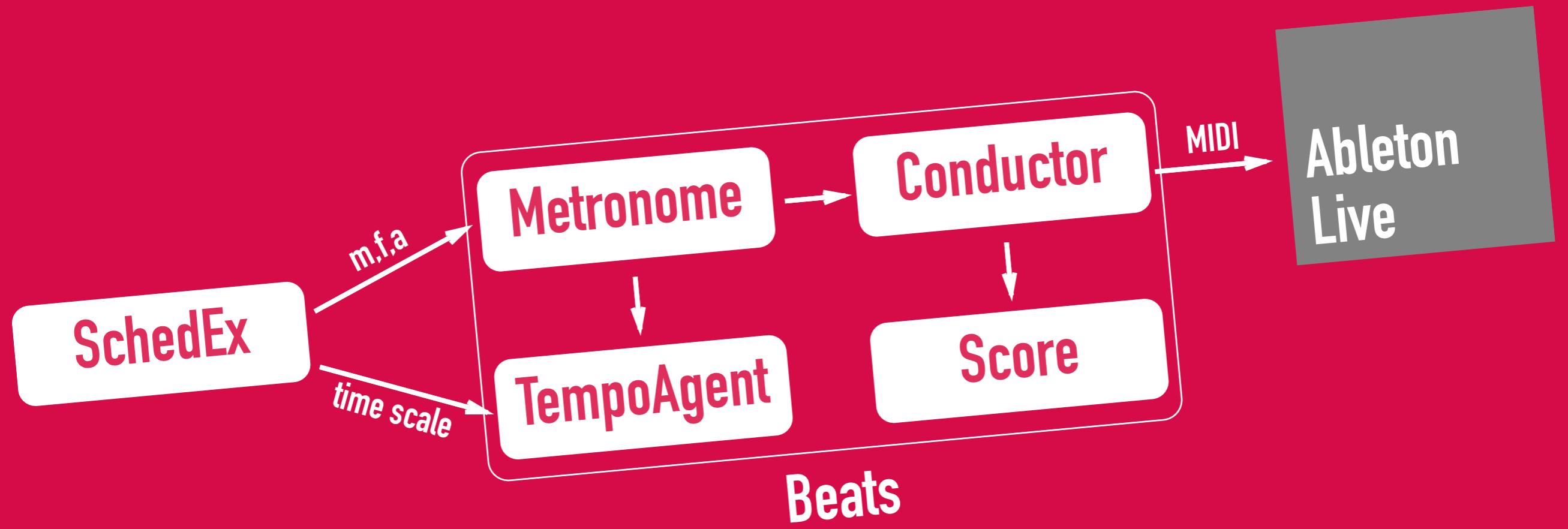




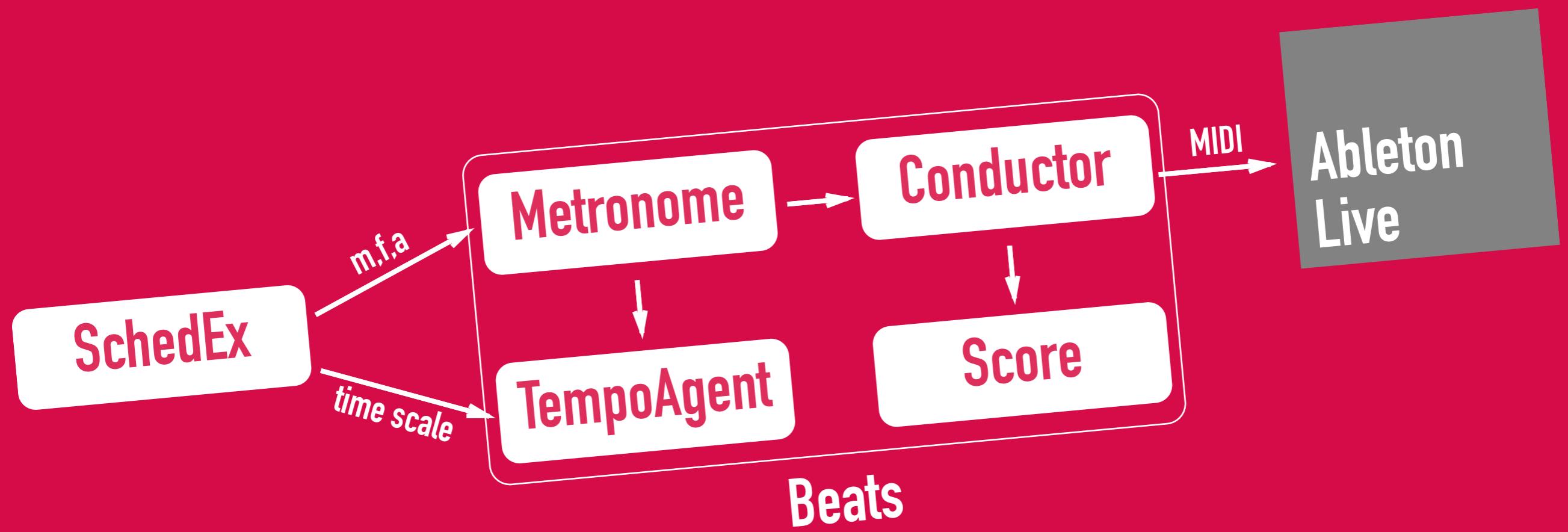




demotime

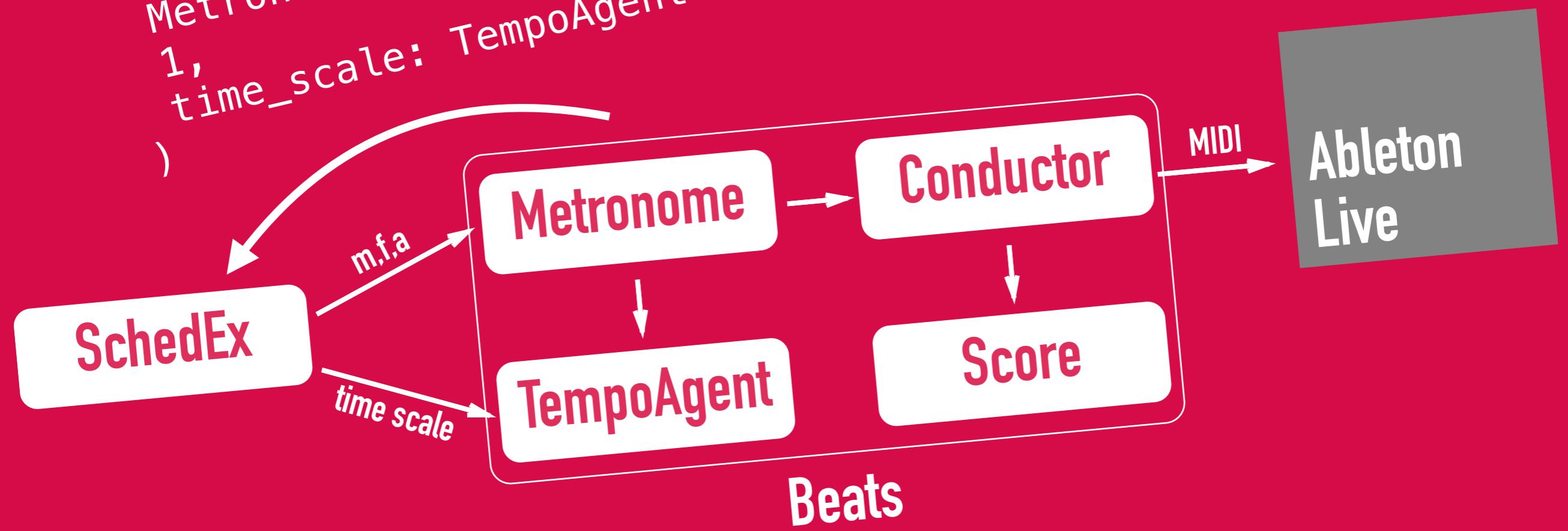


120 bpm

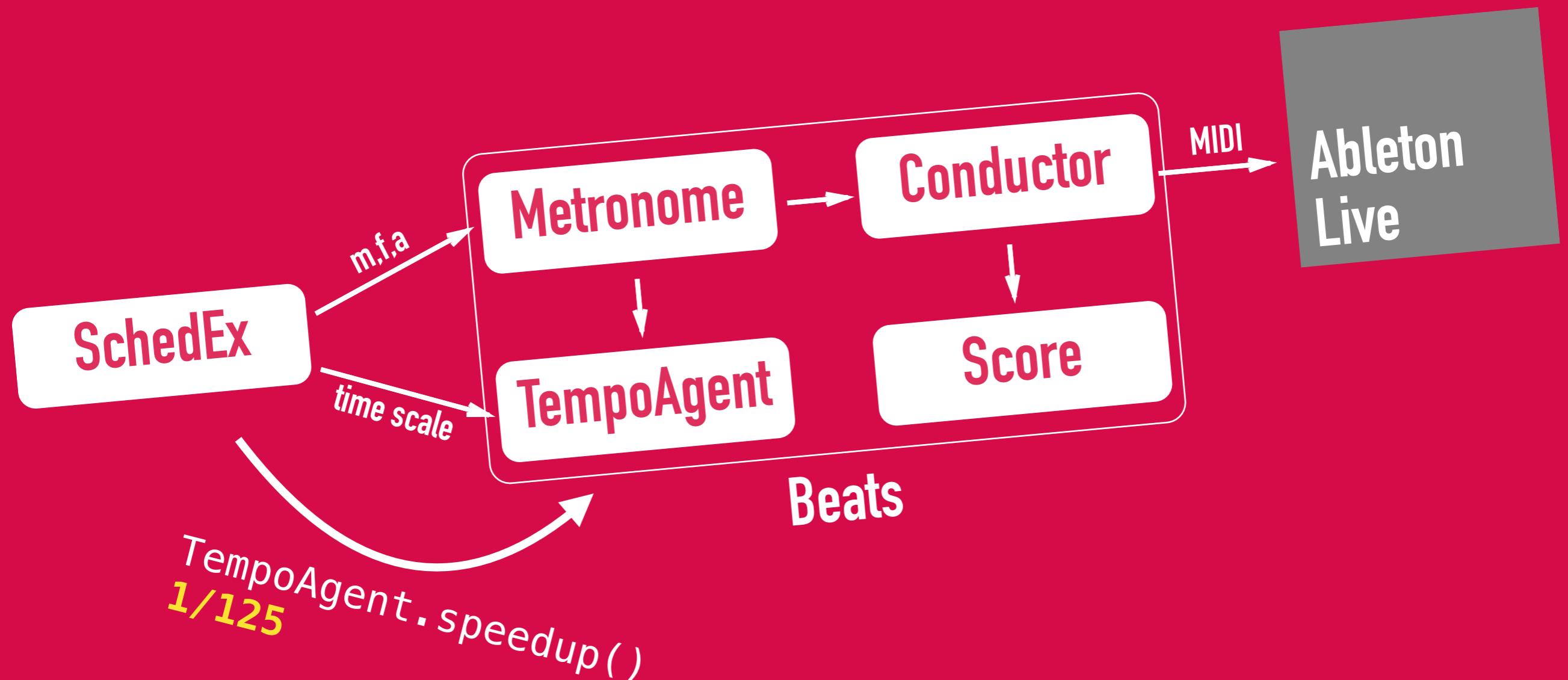


120 bpm

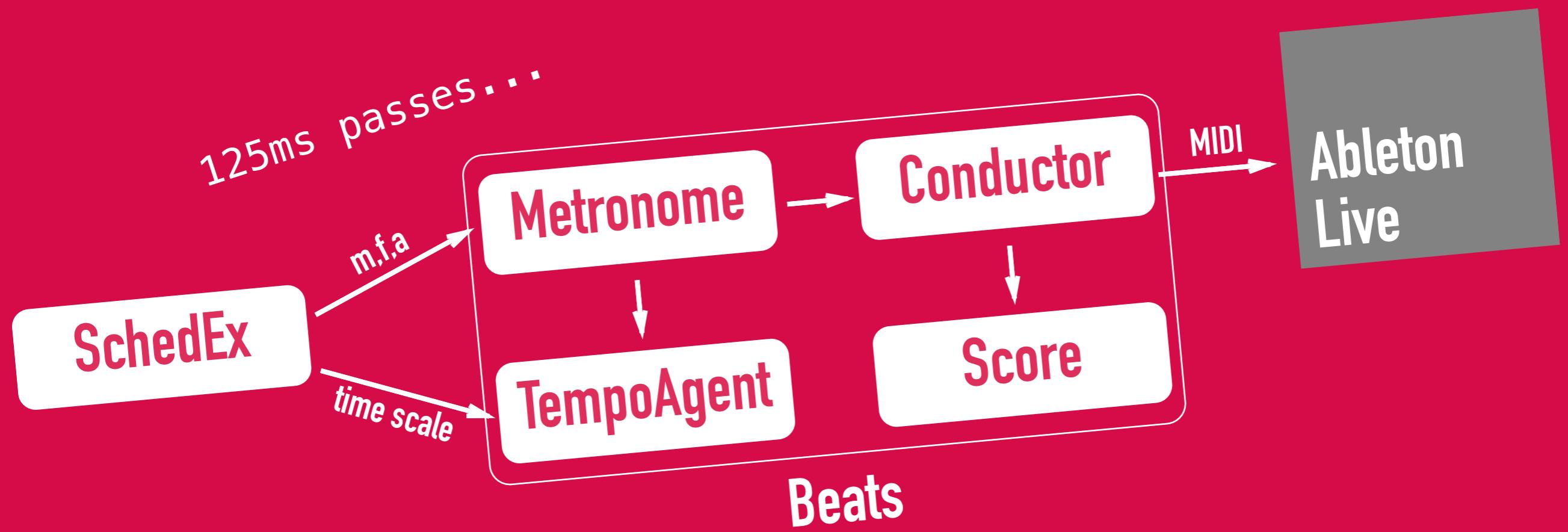
```
SchedEx.run_in(  
    Metronome, :do_tick, [],  
    1,  
    time_scale: TempoAgent  
)
```



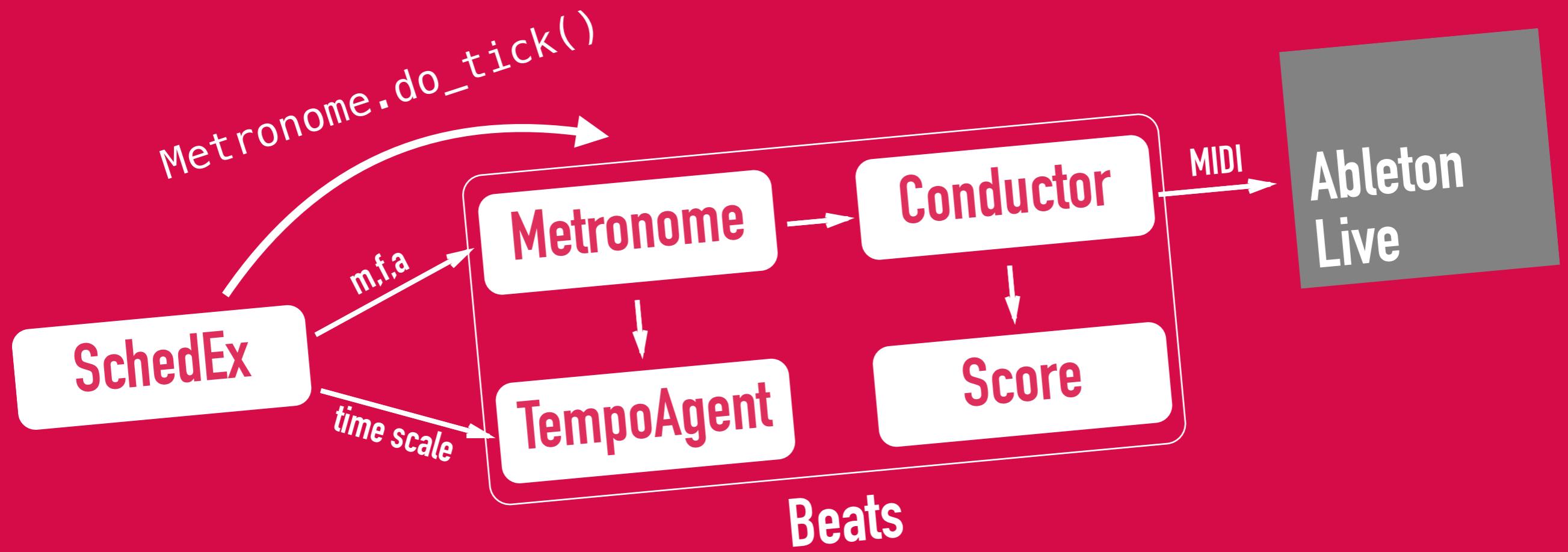
120 bpm



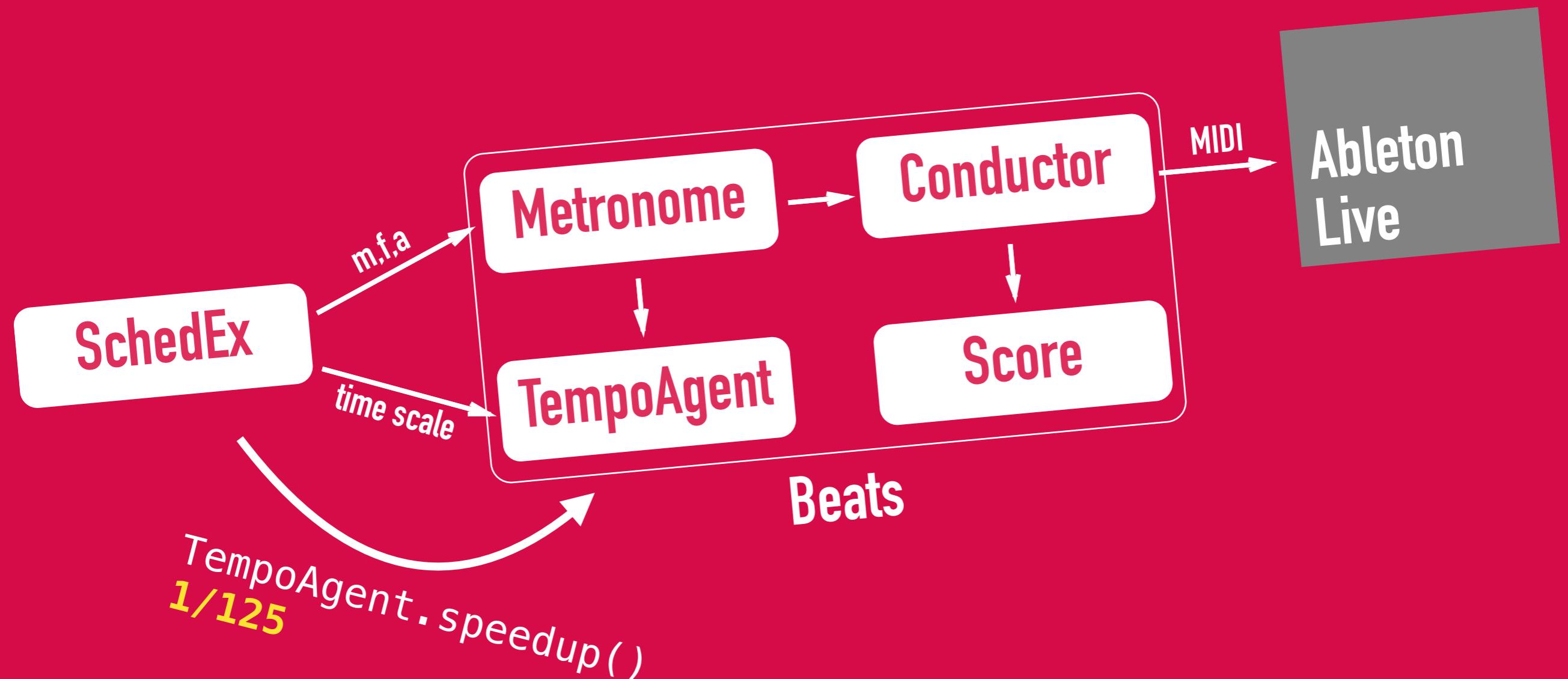
120 bpm



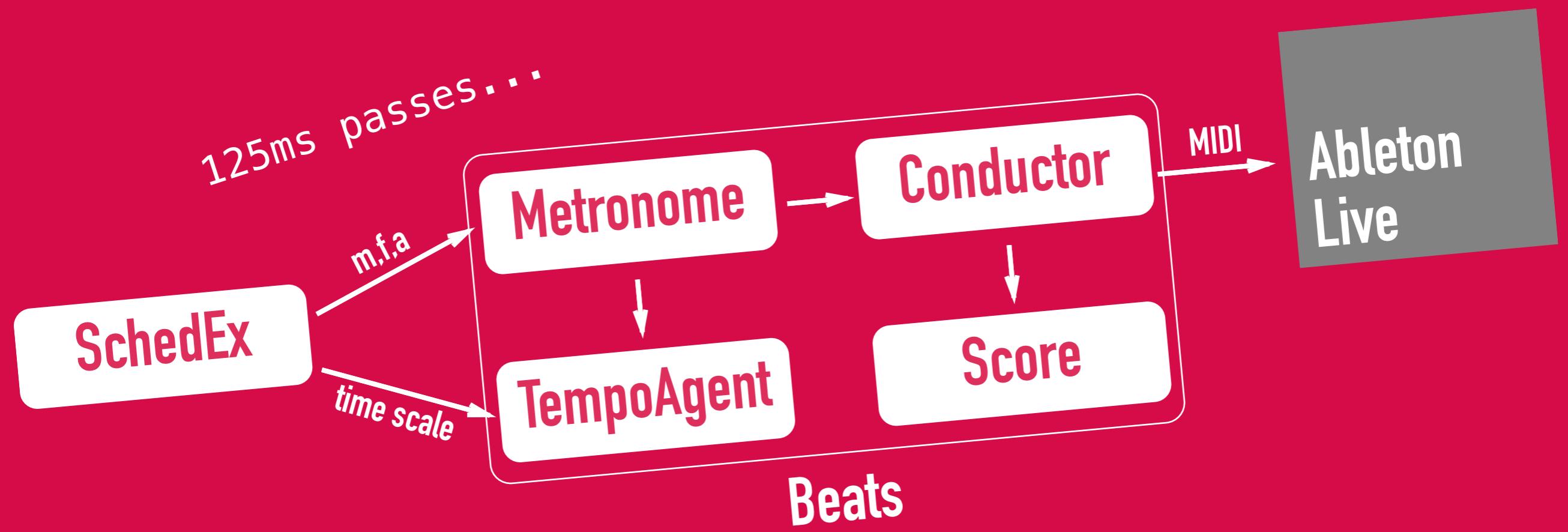
120 bpm



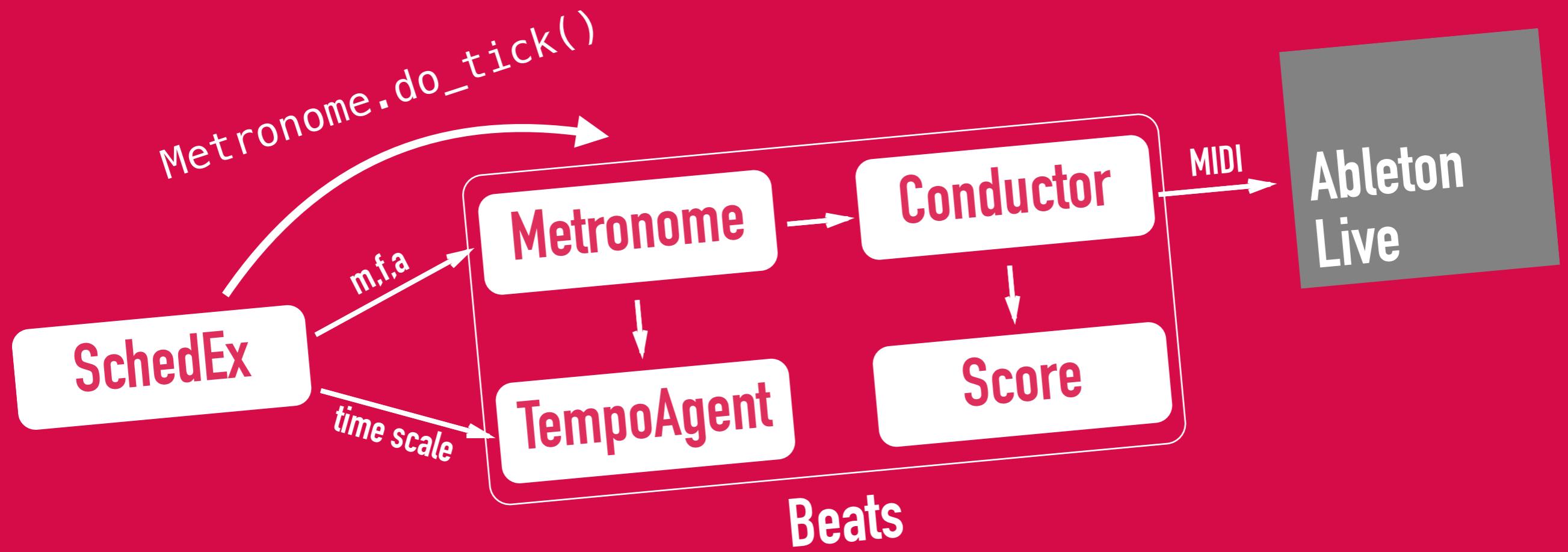
120 bpm



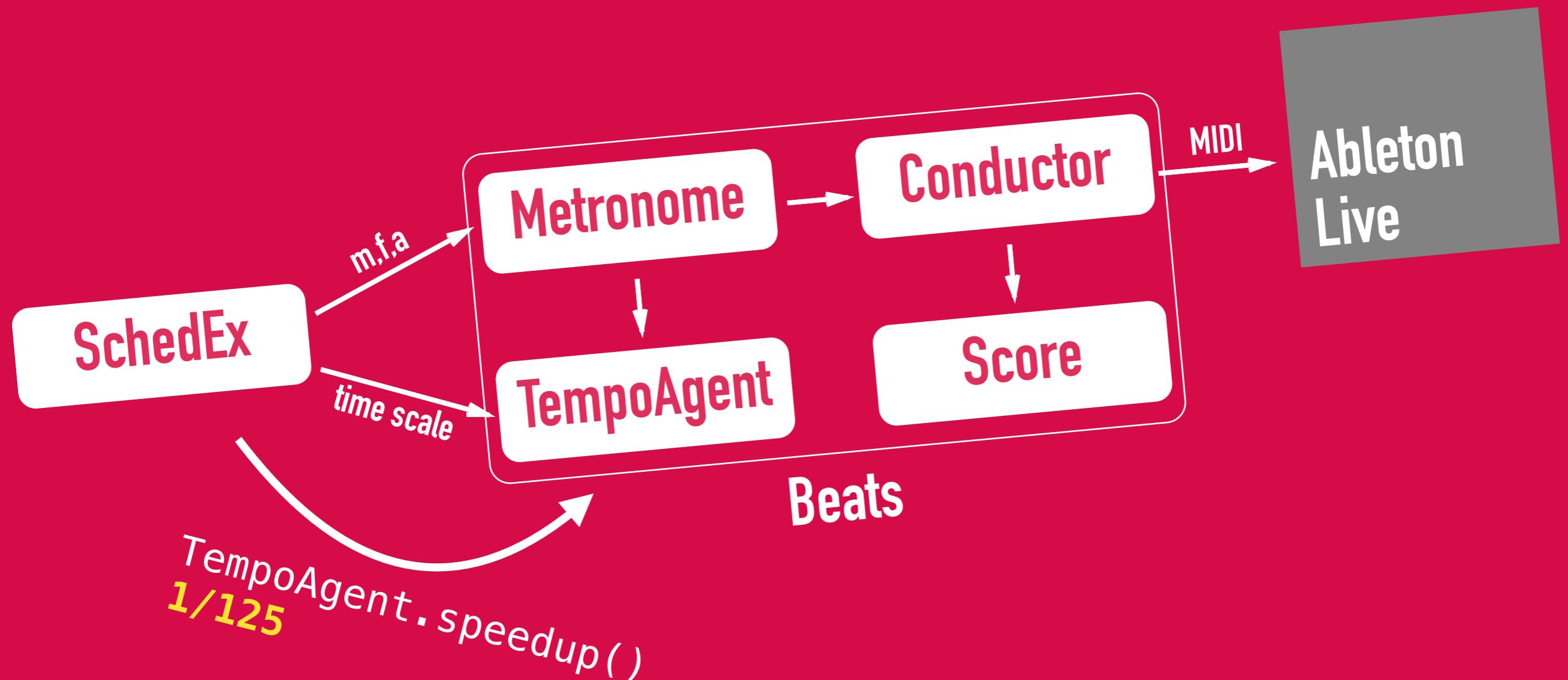
120 bpm



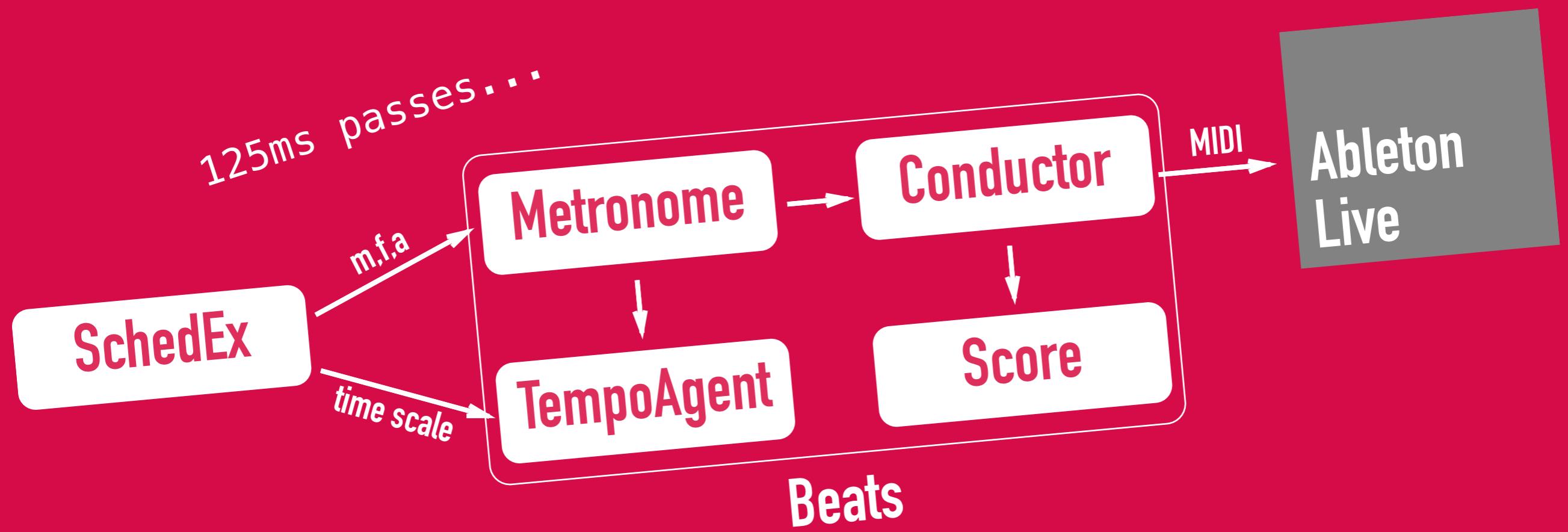
120 bpm



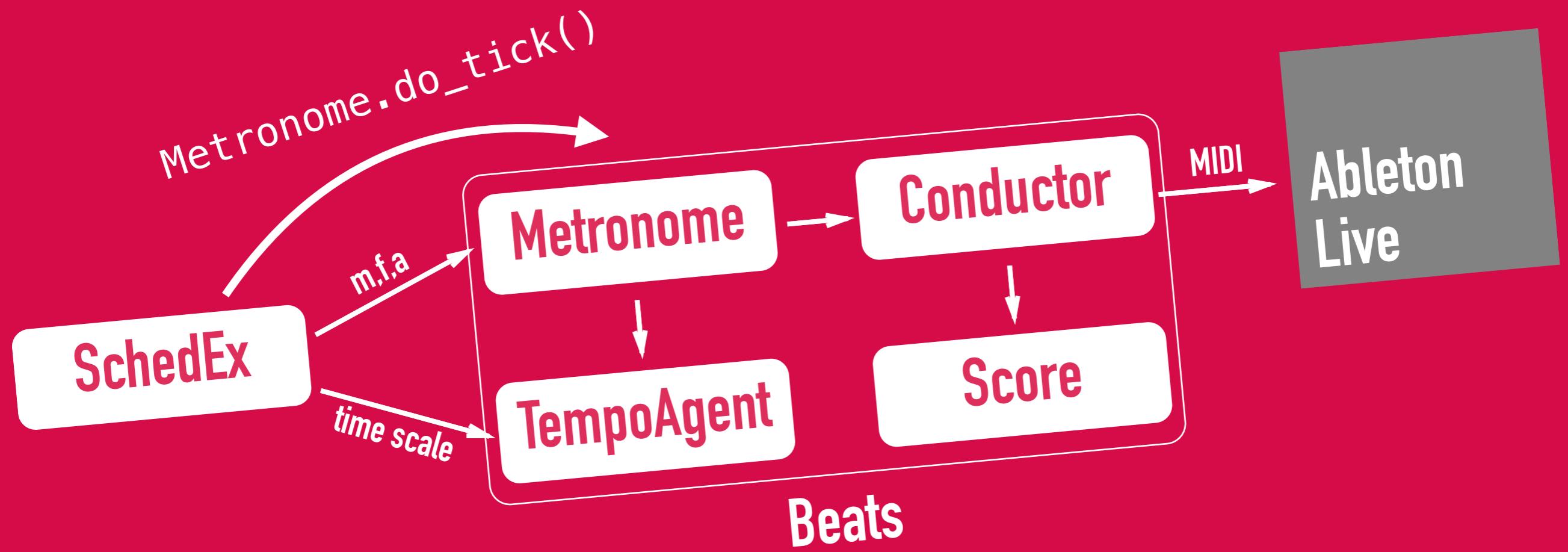
120 bpm



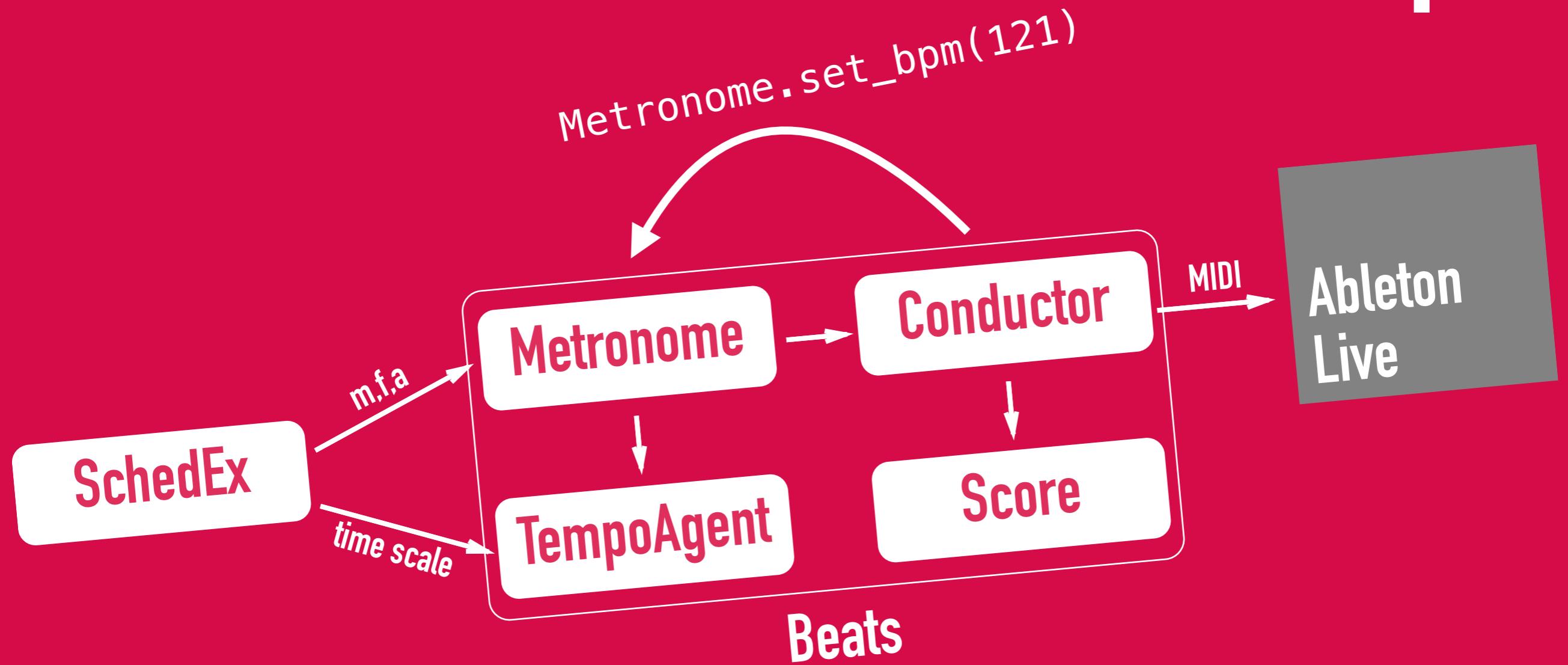
120 bpm



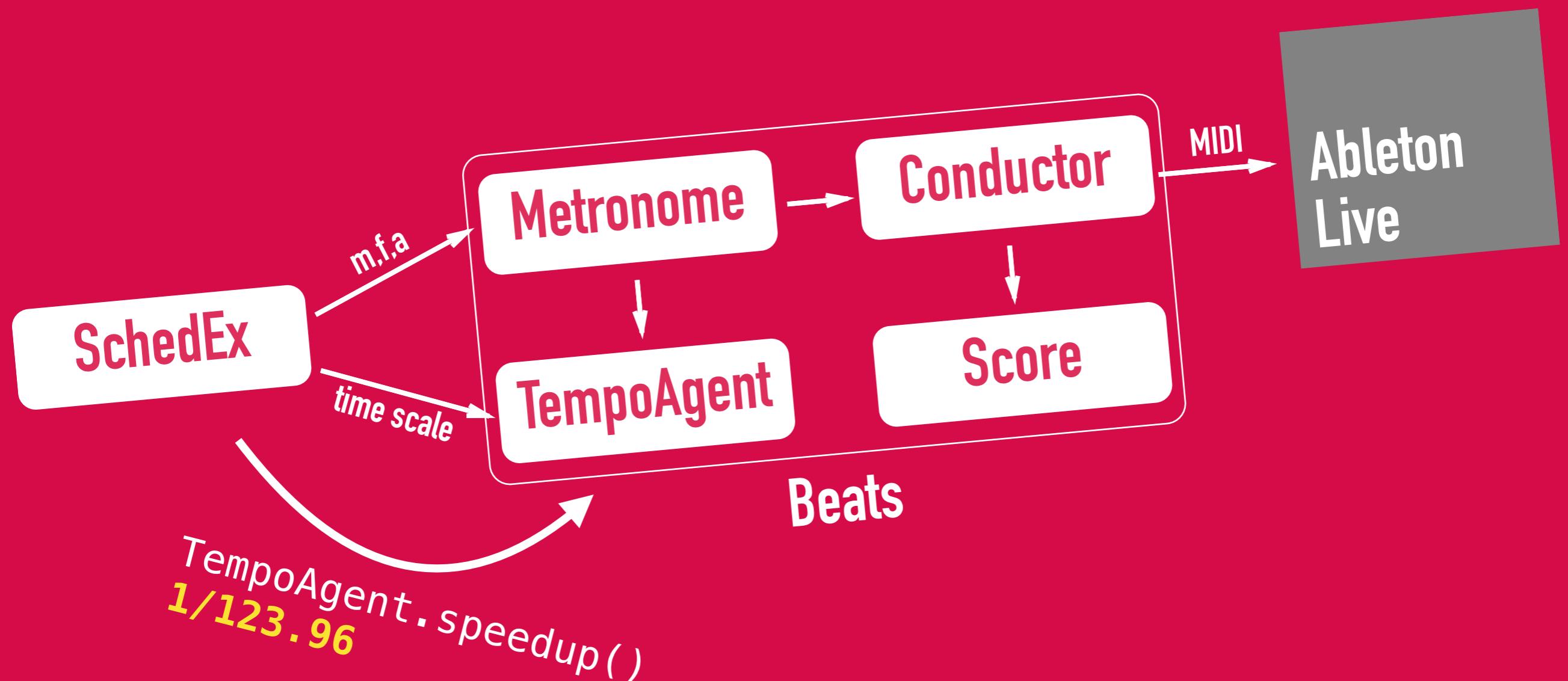
120 bpm



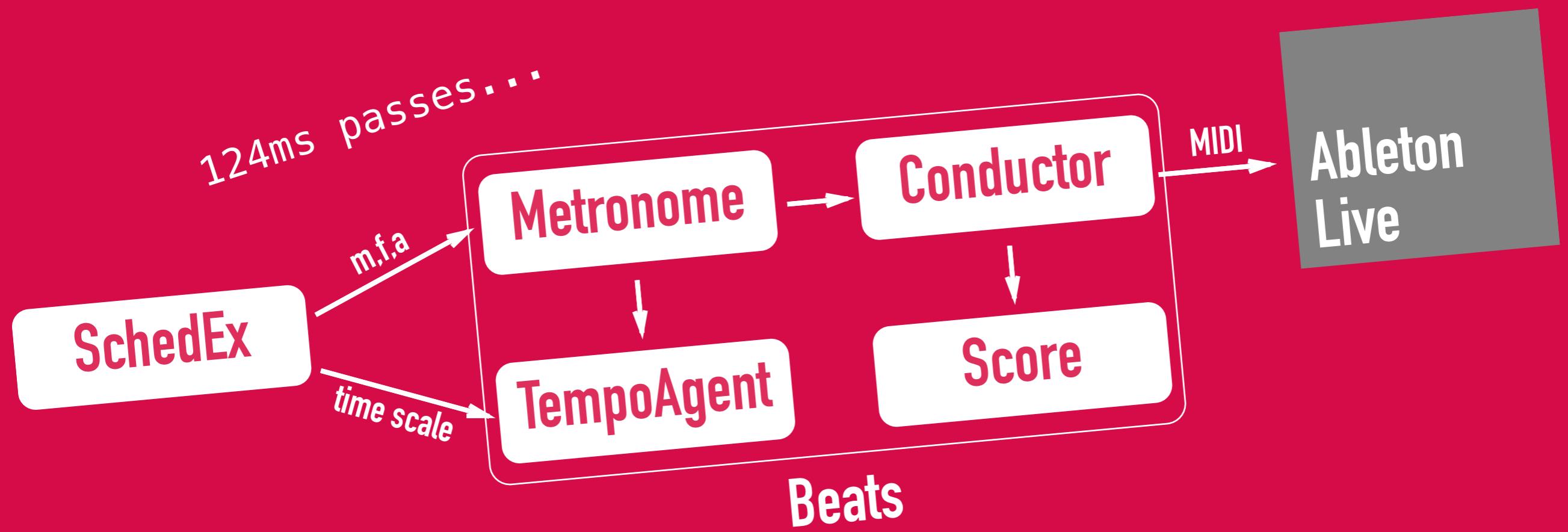
121 bpm



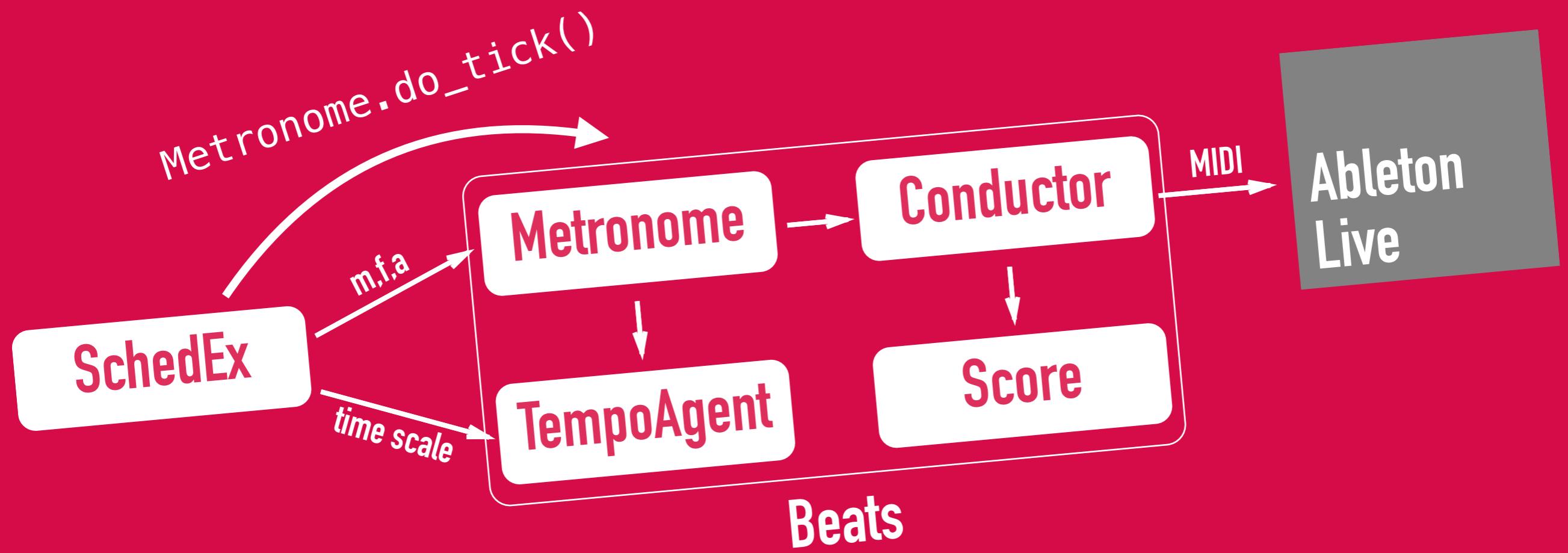
121 bpm



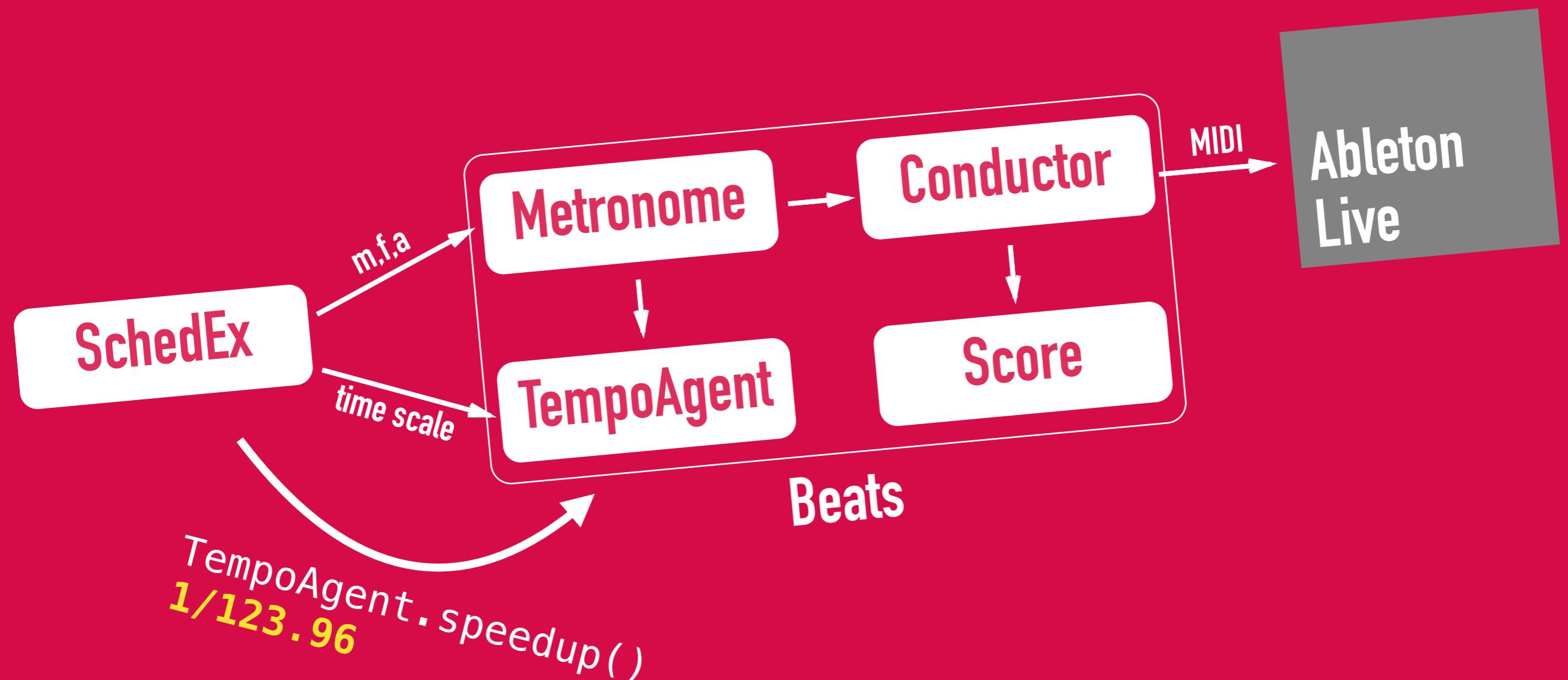
121 bpm



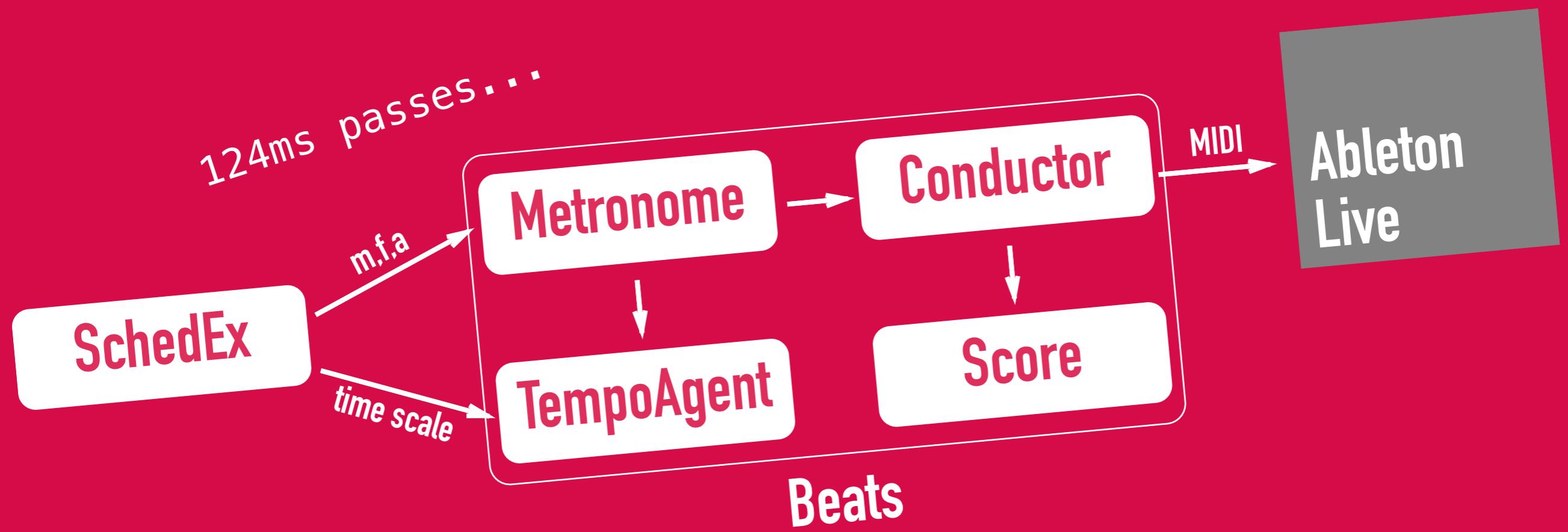
121 bpm



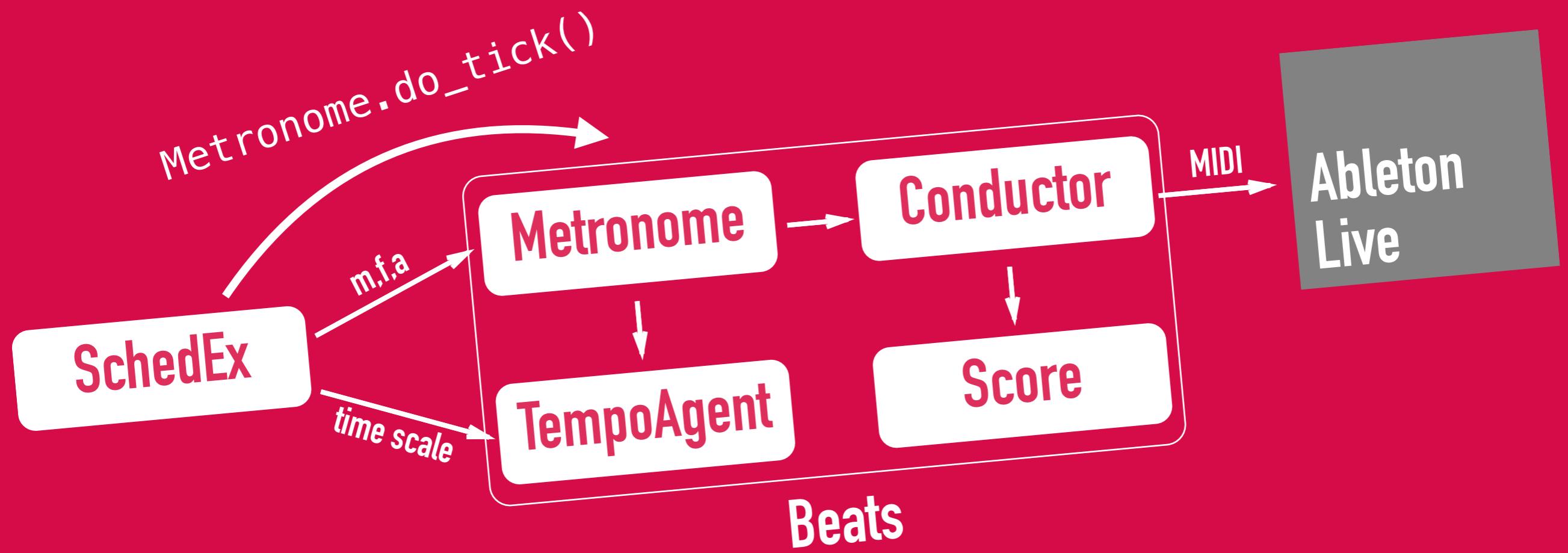
121 bpm



121 bpm



121 bpm



# {:error, :rounding}

120 bpm goal

125ms / step

125ms actual

120 bpm actual

0% error

121 bpm goal

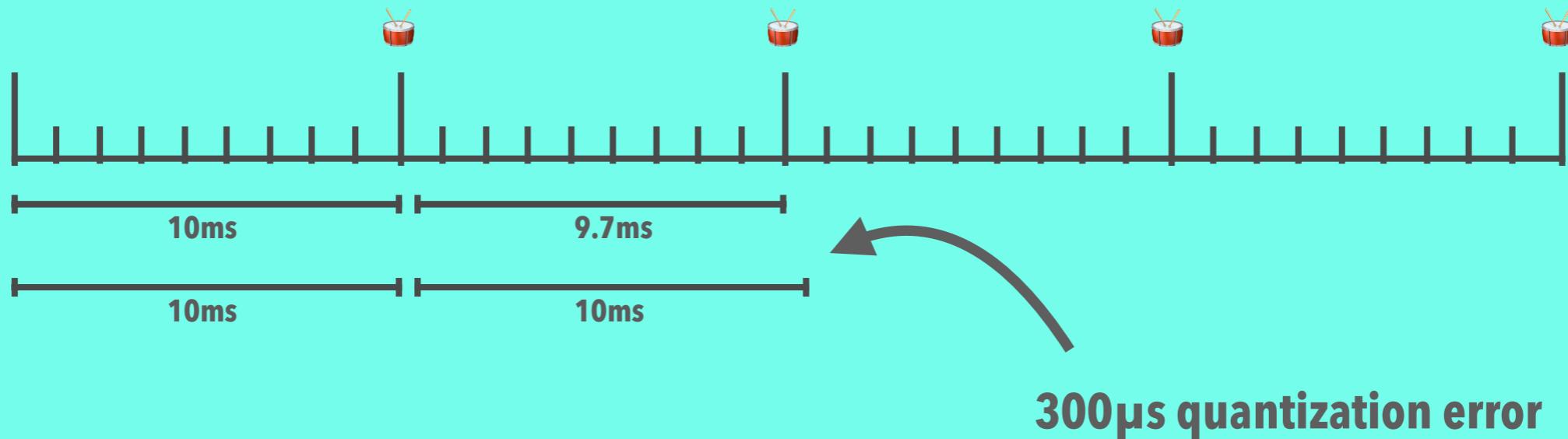
123.96ms / step

124ms actual

120.96 bpm actual

0.05% error

# {:error, :quantization}



solution:

Expose µs delay granularity

# {:error, :dispatch}

"Hey, run something at 10:30:00.000 please"

"Sorry busy; I ran it at 10:30:00.001. Cool?"

"1000µs dispatch delay? OUTRAGEOUS :)"

demotime

[github.com/SchedEx](https://github.com/SchedEx)

[github.com/mtrudel/beats](https://github.com/mtrudel/beats)

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*fin*