

i-score: an overview

Linux Audio Conference - Workshop

Jean-Michaël Celerier

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Context

Foundation: libossia

- Goal

- Protocols

- Interoperability

The sequencer: i-score

- Control

- Temporal structure

- Interactivity

- Devices

Audio features

Conclusion

- ▶ Digital arts: music, video, transmedia, etc...
- ▶ Temporal structure & interactivity.
- ▶ Interoperability: software, hardware.

Nebula

Scénario Pachoud

Bosch

Quarrè

libossia: goals

- ▶ Automatic discovery
- ▶ Shared object model
- ▶ Bare metal ? IncludeOS.
- ▶ Scoring primitives

libossia: protocols

- ▶ OSC
- ▶ Minuit
- ▶ OSCQuery
- ▶ MIDI
- ▶ HTTP (Requires Qt)
- ▶ WebSocket (Requires Qt)
- ▶ Serial port (Requires Qt)

To come: ArtNet (DMX)

Standard protocols

Qt protocols

C++14, Linux, macOS, Windows, GCC, Clang, MSVC, static, dynamic, etc.

```
auto& node = find_or_create_node(device , "/test/my_int");  
auto address = node.create_address(val_type::INT);  
  
node.set(access_mode_attribute{}, access_mode::GET);  
node.set(bounding_mode_attribute{}, bounding_mode::FOLD);  
node.set(domain_attribute{}, make_domain(2, 14));  
node.set(description_attribute{}, "an_integral_value");  
  
address->add_callback([] (const auto& val) {  
    std::cout << val << " ";  
});  
  
address->push_value(5678);
```

Integration with ofParameter, ofParameterGroup

```
ossia::Parameter<bool> _fill;  
ossia::Parameter<ofColor> _color;  
ossia::ParameterGroup _sizeParams;  
...  
_circleParams.setup(_parent_node, "circle");  
  
_sizeParams.setup(_circleParams, "sizeParams");  
_radius.setup(_sizeParams, "radius", 10., 1., 100.);  
_position.setup(_sizeParams,  
                "position",  
                ofVec2f(ofGetWidth() / 2, ofGetHeight() / 2),  
                ofVec2f(0., 0.), // Min  
                ofVec2f(ofGetWidth(), ofGetHeight())); // Max
```

ossia-pd (and ossia-max soon)

ossia-python

```
# create a node, create a tuple address and initialize it
tuple_node = local_device.add_node("/test/value/tuple")
tuple_address = tuple_node.create_address(
    ossia.ValueType.Tuple)
tuple_value = ossia.Value([
    ossia.Value(44100),
    ossia.Value("test.wav"),
    ossia.Value(0.9)]
)
tuple_address.push_value(tuple_value)

# attach a callback function to the boolean address
def bool_value_callback(v):
    print(v.get())
    bool_address.add_callback(bool_value_callback)
```

ossia-unity3D (C#)

```
public class Foo : MonoBehaviour
{
    [Ossia.Attribute]
    int foo;
}
```


ossia-qml (Qt QML)

```
Item {  
    Ossia.Node { name: 'test' }  
    AngleSlider {  
        // Reads and writes from /test/angle  
        Ossia.Property on angle {  
            min: -90  
            max: 0  
            bounding: Ossia.Context.Clip  
        }  
    }  
}
```

ossia-C (C99)

OSSIA_EXPORT

```
bool ossia_device_update_namespace(  
    ossia_device_t device);
```

OSSIA_EXPORT

```
ossia_node_t ossia_device_get_root_node(  
    ossia_device_t device);
```

OSSIA_EXPORT

```
const char* ossia_device_get_name(  
    ossia_device_t node);
```

//// Node ////

OSSIA_EXPORT

```
ossia_node_t ossia_node_add_child(  
    ossia_node_t node,  
    const char * name);
```

Demonstration

i-score + PureData + Processing

Sending messages

The screenshot displays a Pure Data patch window titled "Example /". The patch contains a message box with the text "OSCdevice" and a blue circle with a yellow star, representing a trigger or event. The patch is connected to an "OSCdevice" object. The interface includes a menu bar (File, Edit, Object, Play, Tool, View, Settings, About), a toolbar with various icons, and a "Device Explorer" panel on the left showing the "OSCdevice" object. The "Inspector" panel on the right shows the properties of the selected object, including its name, label, default date, trigger settings, events, condition, state, and address.

Device Explorer

Address	Val
OSCdevice	

Inspector

Name laws73dock5
Label

Default date 2 s 234 ms

Trigger

Enable trigger

Events

▼ rash75oval66

Name rash75oval66
Label

Parent TimeNode

Condition

State

Address	Value
OSCdevice example	0

Prev Constraint

Add process

Automating

The screenshot displays a software interface for automating an OSCdevice. The interface is divided into three main sections: a top menu bar, a central workspace, and side panels.

Top Menu Bar: Includes File, Edit, Object, Play, Tool, View, Settings, and About. Below the menu is a toolbar with various icons for navigation and editing.

Device Explorer (Left Panel): A table showing the hierarchy of objects. The table has two columns: "Address" and "Val".

Address	Val
OSCdevice	
example	0

Central Workspace: A timeline view showing a sequence of events. The timeline has a horizontal axis with time markers at 0:00.0, 0:02.500, 0:05.0, 0:07.500, and 0:10.0. A blue line represents the timeline, and a red line indicates the current position. A blue box labeled "automation" is positioned on the timeline, with a red line extending from it to the right. The box contains the text "...lce/example".

Inspector (Right Panel): A panel showing the properties of the selected object, "automation".

Automation Properties:

- Name: automation
- Label: (empty)
- Speed x1: x 0 | x 0.5 | x 1 | x 2 | x 5
- Start State: (button)
- Full view: (button)
- End State: (button)
- Default Duration: 0.00.03.786
- Add Process: (button)
- Automation.1: (dropdown)
- Address: OSCdevice/example
- Tween: ☐
- Min: 0.00000
- Max: 1.00000
- Unit: None
- Start: OSCdevice/example 0
- End: OSCdevice/example 1

Interpolating

The screenshot displays a software interface with a dark theme, featuring a timeline and an Inspector panel.

Device Explorer: Located on the left, it shows a tree structure with "OSCdevice" expanded, containing an "example" object with a value of 10.

Timeline: The central area shows a timeline with markers at 0:00.0, 0:02.500, 0:05.0, 0:07.500, and 0:10. A blue clip labeled "automation" is positioned on the timeline, starting at 0:00.0 and ending at 0:10. The clip's label is "automation" and its address is "...Ice/example". A green line within the clip indicates a linear interpolation from 0 to 10 over the 10-second duration.

Inspector: Located on the right, it displays the properties of the selected "automation" object. The "Name" is "automation" and the "Label" is "Label". The "Speed x1" is set to 1.0, with a range from 0.0 to 5.0. The "Default Duration" is 0.00.03.786. The "Interpolation.1" section shows the address as "OSCdevice/example", the "Tween" is set to "Start -2", and the "End" is 10.

Tweening

The screenshot displays a software interface for managing a timeline or animation. The main window is divided into three primary sections: a menu bar at the top, a central timeline, and two side panels.

Menu Bar: Includes options for File, Edit, Object, Play, Tool, View, Settings, and About.

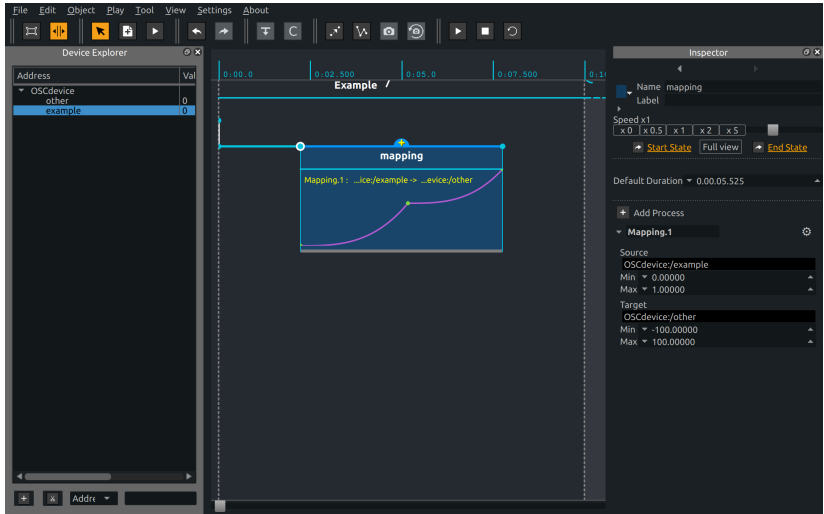
Device Explorer (Left Panel): Contains a table with columns for 'Address' and 'Val'. Below the table is a scroll bar and a section with a plus icon, a magnifying glass icon, and a dropdown menu labeled 'Addr'.

Timeline (Center): Features a horizontal axis with time markers at 0:00.0, 0:02.500, 0:05.0, 0:07.500, and 0:10. A blue bar labeled 'Example /' spans the duration. A red line graph, labeled 'tweening', is plotted within a blue rectangular area, showing a fluctuating path. A yellow playhead is positioned at the 0:10 mark.

Inspector (Right Panel): Provides configuration options for the selected 'tweening' process.

- Name:** tweening
- Label:** (empty)
- Speed x1:** A row of buttons labeled x0, x0.5, x1, x2, and x5. The 'x1' button is currently selected.
- Buttons:** Start State, Full view, and End State.
- Default Duration:** 0.00.06.953
- + Add Process** button.
- Automation.1** (expanded):
 - Address:** (empty)
 - Tween:** ☐ (unchecked)
 - Min:** 0.00000
 - Max:** 0.00000
 - Unit:** None
 - Start:** 0
 - End:** 0

Mapping



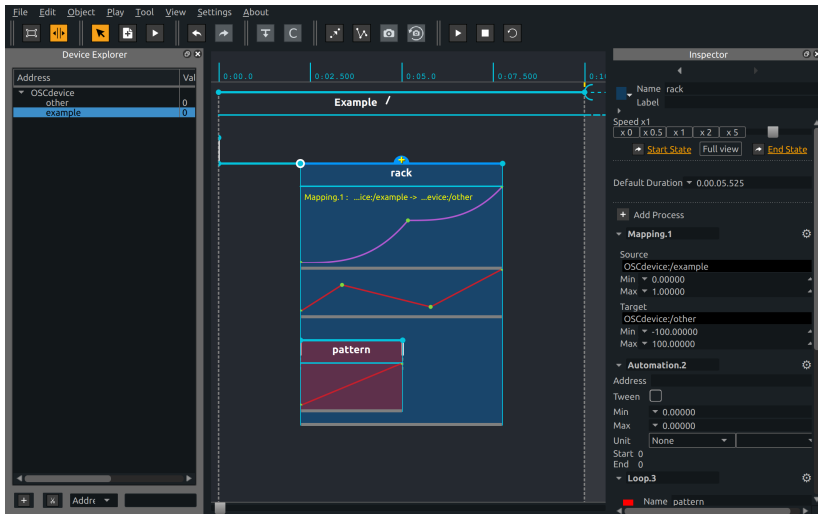
Scripting

The screenshot displays a software interface for scripting, likely for a game engine or animation tool. The interface is divided into several panels:

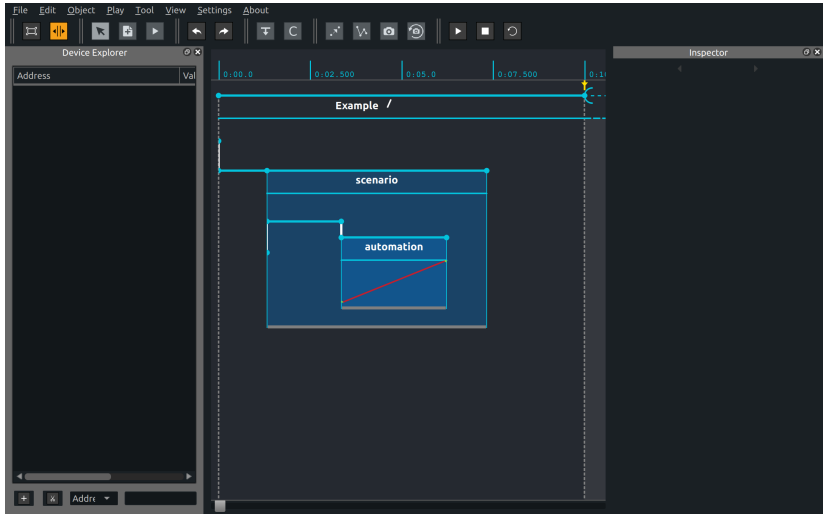
- Top Panel:** Contains a menu bar with options: File, Edit, Object, Play, Tool, View, Settings, About. Below the menu is a toolbar with various icons for navigation and editing.
- Device Explorer:** Located on the left, it shows a table with columns for Address and Value. The Address column is currently empty, and the Value column shows 'Val'.
- Timeline:** A horizontal bar at the top of the main workspace area, showing time markers at 0:00.0, 0:02.500, 0:05.0, 0:07.500, and 0:10.0. A blue line represents the current state or object being edited.
- Script Editor:** A central area with a dark background, containing a script titled 'script'. The script is written in JavaScript and defines a function 't' that creates a new object and sets its properties. The script is as follows:

```
1 (function(t) {  
2   var obj = new Object;  
3   obj["address"] = 'OSCdevice:/millumin/layer/x/instance';  
4   obj["value"] = t + iscore.value('OSCdevice:/millumin/layer/y/instance');  
5   return [ obj ];  
6 });
```
- Inspector:** Located on the right, it shows the properties of the selected object, 'Example'. The properties include:
 - Name:** Example
 - Label:** (empty)
 - Speed x1:** A dropdown menu with options x0, x0.5, x1, x2, x5. The current selection is x0.5.
 - Trigger:** A dropdown menu with the option False.
 - Start State:** A button labeled 'Start State'.
 - Full view:** A button labeled 'Full view'.
 - End State:** A button labeled 'End State'.
 - Default Duration:** A dropdown menu with the value 0.00.10.000.
 - Min Duration:** A dropdown menu with the value 0.00.10.000.
 - Max Duration:** A dropdown menu with the value Infinity.
 - Add Process:** A button labeled '+ Add Process'.
 - Scenario.1:** A dropdown menu with the value Scenario.1.

Racks



Hierarchy



Loops

The screenshot displays a software interface for creating and editing timelines. The main workspace shows a timeline with a blue bar labeled "Example /" and a nested blue bar labeled "loop". Inside the "loop" bar is a purple bar labeled "pattern". A red diagonal line is visible within the "pattern" bar. The timeline has a time scale at the top with markers at 0:00.0, 0:02.500, 0:05.0, and 0:07.500. On the left, a "Device Explorer" panel shows a table with "Address" and "Value" columns. On the right, an "Inspector" panel provides details for the selected object, "loop".

Inspector Panel Details:

- Name:** loop
- Label:**
- Speed x1:** x 0 | x 0.5 | x 1 | x 2 | x 5
- Buttons:** Start State, Full view, End State
- Default Duration:** 0.00.07.017
- Buttons:** + Add Process
- Loop.1:**
 - Name:** pattern
 - Label:**
 - Speed x1:** x 0 | x 0.5 | x 1 | x 2 | x 5
 - Buttons:** Start State, Full view, End State
 - Default Duration:** 0.00.03.437
 - Buttons:** + Add Process
- Automation.1:**
 - Address:**
 - Tween:** ☐
 - Min:** 0.00000
 - Max:** 0.00000
 - Unit:** None
 - Start:** 0
 - End:** 0

Interactivity: conditions

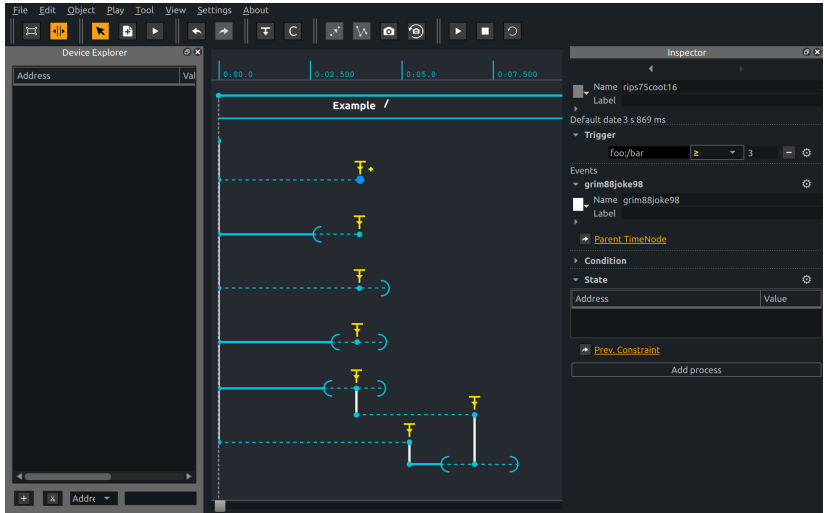
The screenshot displays a software interface with a dark theme, featuring a timeline and an inspector panel.

Timeline: The timeline is located in the center and shows a sequence of events. A horizontal bar at the top is labeled "Condition /". Below this, a blue line represents a condition that starts at 0:00.0 and ends at 0:10.0. A yellow arrow points to the end of this condition at 0:10.0. Below the condition bar, there are several blue lines representing events. A yellow arrow points to the start of the first event at 0:02.500. A yellow bracket highlights a group of events between 0:02.500 and 0:05.0. The timeline has a vertical axis on the left with a scale from 0:00.0 to 0:10.0.

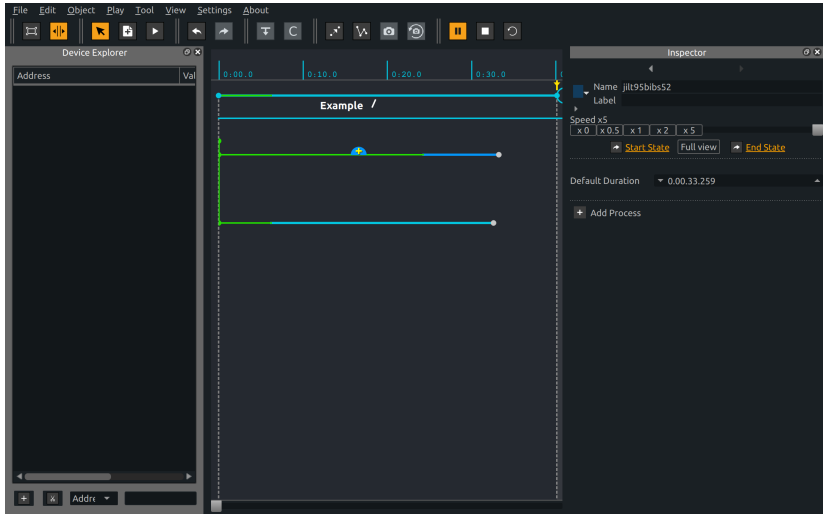
Inspector Panel: The inspector panel is located on the right side of the interface. It shows the details of the selected object, "babb54hymn24". The panel includes a "Name" field with the value "babb54hymn24", a "Label" field, and a "Default date" field with the value "4 s 809 ms". The "Trigger" section has a button labeled "Enable trigger". The "Events" section lists several events: "skim8bogs97", "alto6axon42", and "alto6axon42". The "Condition" section shows a dropdown menu with the value "a/b", a button with the value "3", and a button with a minus sign. The "Offset behaviour" section has a dropdown menu with the value "True".

Device Explorer: The Device Explorer is located on the left side of the interface. It shows a list of devices with columns for "Address" and "Val".

Interactivity: trigger points



Interactivity: execution speed



Working with external devices

- ▶ Automatic discovery
- ▶ Loading
- ▶ Manual entry
- ▶ Introspection

Demonstration

MIDI control surface and WebSockets



Audio: sounds, live input

Hierarchical mixing.

Audio: applying effects

Audio: send, returns

What's missing

- ▶ Multichannel operation.
- ▶ Displaying LV2 UIs...
- ▶ Musical time structures (bars, metronome, etc).
- ▶  Packaging for distros 

Work-in-progress

- ▶ Embedded score player.
- ▶ Network operation.
- ▶ Plug-in API.
- ▶ Full-fledged audiograph.
- ▶ Ongoing work on UI.

Workshop

- ▶ Building scores
- ▶ Experimenting with your favorite environments