An object oriented model for the representation of temporal data in the Integra framework

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Lund University

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What is Integra?

- "A European Composition and Performance Environment for Sharing Live Music Technologies"
- An EC financed project led by Birmingham Conservatoire in the UK
- Attempts to address the problems of persistent storage, portability and standardized intercommunication between systems for electronic music.

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Objective

For this research the objectives are:

- To complement the (synchronous) Integra module with the ability to store and edit time-based data.
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  - An abstract definition (and possible implementation) of a DSP process, a documentation item or a relation between modules.
- It should be possible to use the same time data regardless of module implementation.
- It should be possible to extend and alter existing work.
- The work here is a proposal, and work is currently at the development stage.

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Related work (music)

MIDI

The (still?) dominant mechanism for time based information.

SDIF and GDIF

Spectral and gestural data. May be incorporated in IXD.

MetriXML

CLAM's XML based score file format. Similar to IXD sequences.

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Related work (general)

SMIL

A W3C endorsed multimedia format for synchronizing multimedia.

RDF

A language for describing resources (on the web).

OWL

Exhaustive (RDF related) language for descriptive ontologies.

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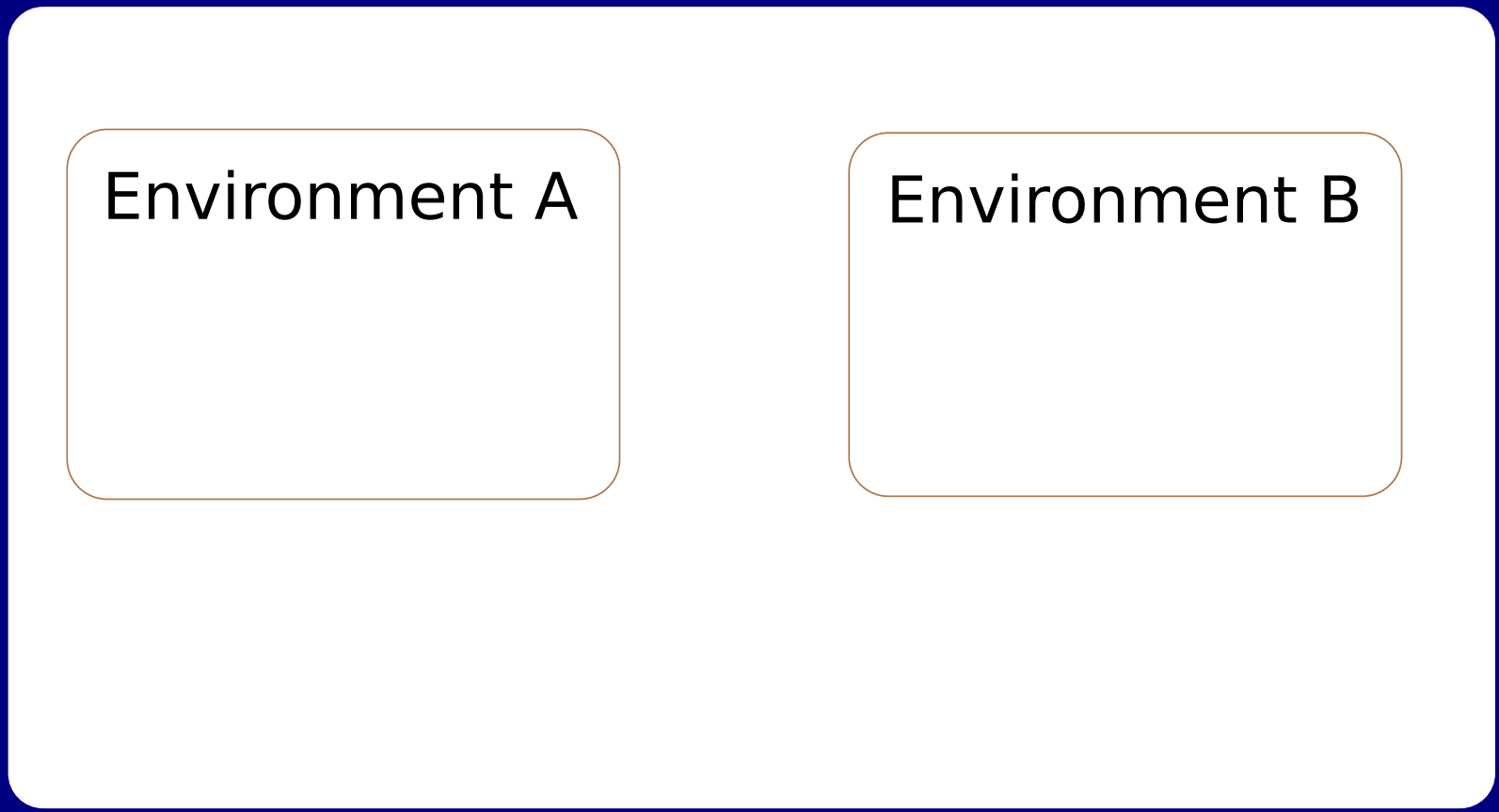

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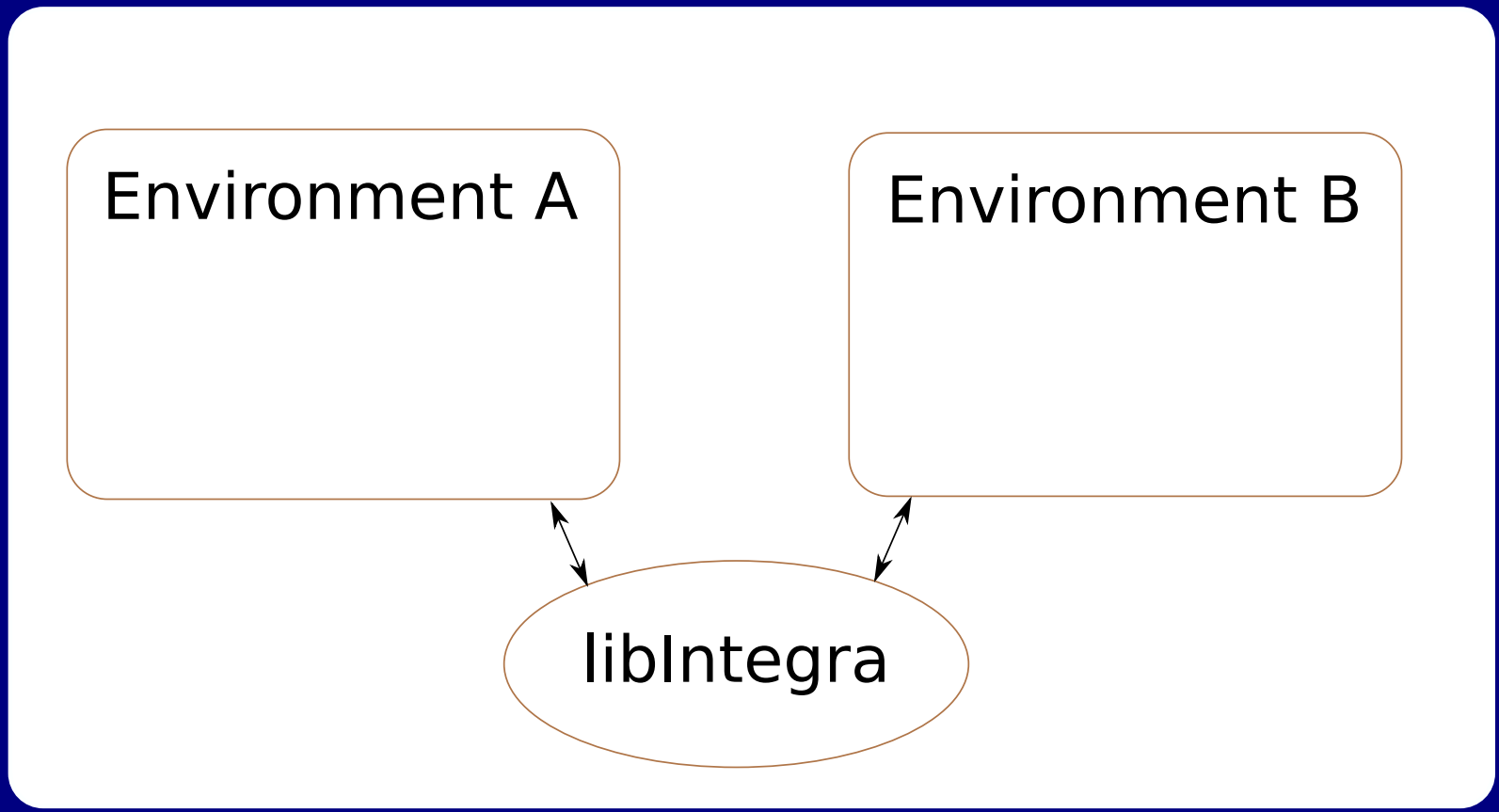

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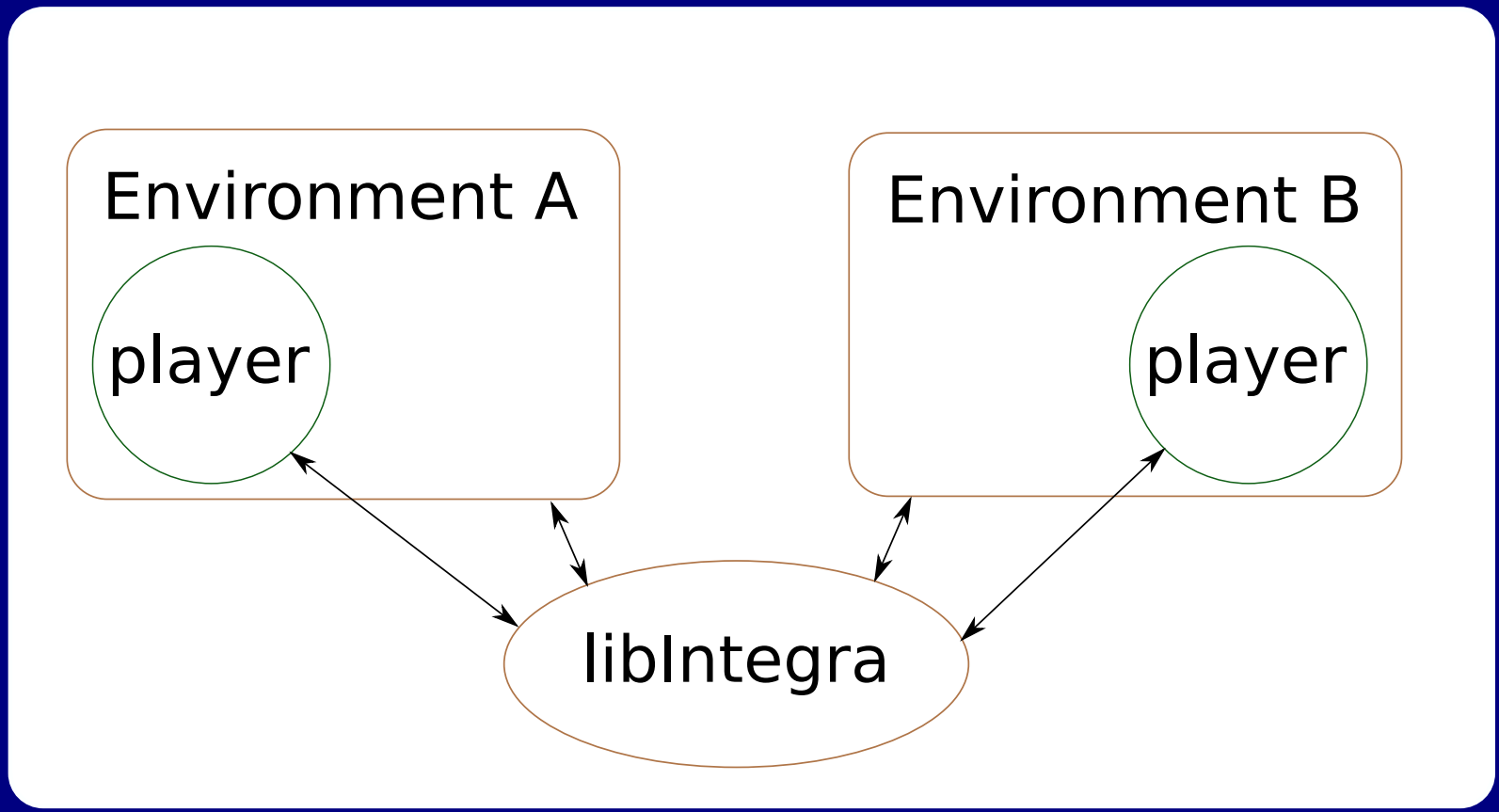

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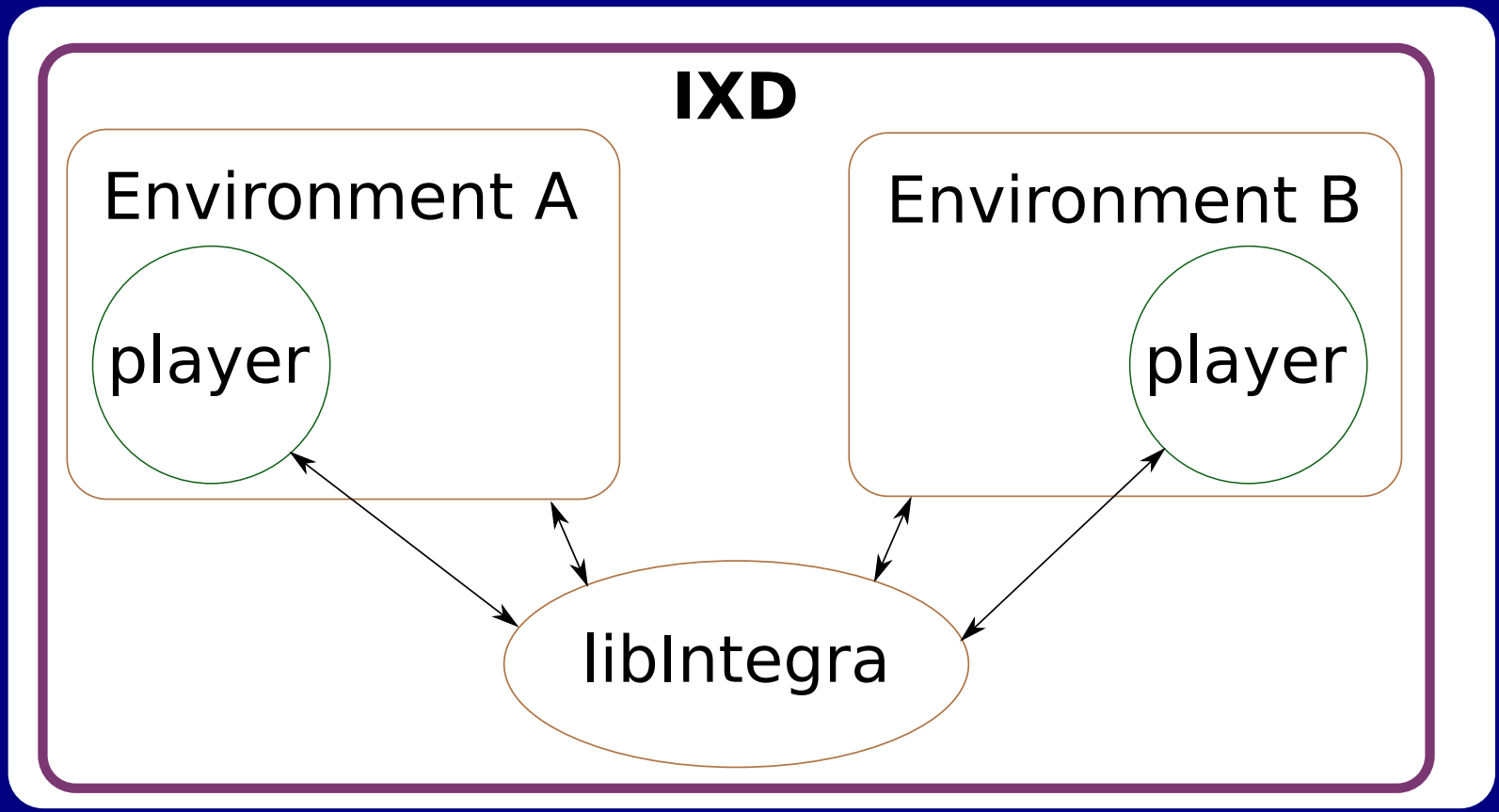

The player module

Schedule events

- continuously in Sequences
- statically as in state changes in Presets

Player features

- looped and reverse-looped playback of sequenced data
- random access to sequence data
- non-linear sequences
- relative representation of time (non-absolute)
- non-track based

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The Event interface

Events

'events' scheduled by the player are instances of the Event interface. Its attributes are:

- address
- value
- interpolation

Presets

Presets inherit from the Event class: An event that contains events.

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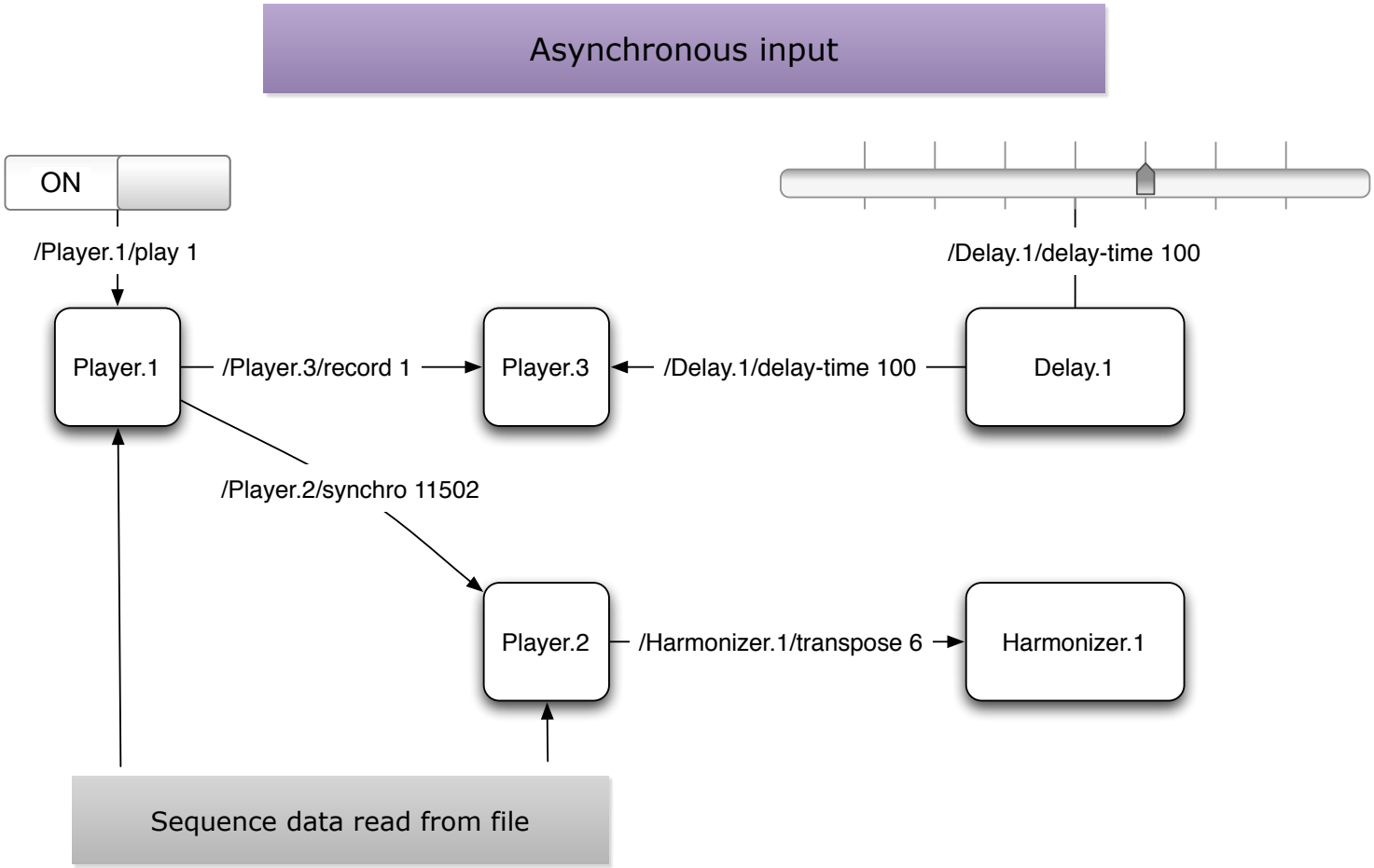
Player module example



Storage

The IXD file format

- Already used for module definitions and collections of modules (patches).
- Time based data forms an extension to the existing formats.

Sequence

Sequences of events in time.

Preset

A set of events describing a state.

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Re-usability

A Sequence can link in other Sequences, or parts of other Sequences:

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Storing Sequences

Sequences

List of timed events. Sequences may trigger other Sequences.

```
<sequence id=0>
  <event tick="0" id="1"
         marker="Foo Bar">
    <address class="delay"
             attribute="time"/>
    <value>400</value>
  </event>
  <!-- we deleted event id="2"
       at some point -->
  <event tick="0" id="3"
         marker="">
    <!-- this goes to 'another'
         player -->
    <address class="player"
             attribute="play"/>
    <value>1</value>
  </event>
  <event tick="100" id="4"
         marker="Baz Bam">
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Storing Presets

Preset

Presets define events: address/value pairs with no time information

```
<preset class="delay" name="delay preset 1">
  <event>
    <address attribute="frequency"/>
    <value>800</value>
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  <event>
    <address attribute="phase"/>
    <value>0.5</value>
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```
<event tick="100"
       type="preset"
       href="mypreset.ixd"
       id="5"
       marker="Load delay preset 1"
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Inheritance

Overriding properties

Existing data may be extended, dynamically or statically.

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<sequence>
 <name>sawtooth_mod</name>
 <description>Simple linear ramping to
 modulate the frequency of a sawtooth
 oscillator</description>
 <tag>ramp</tag>
 <event tick="0" id="1"
        marker="Section 1">
   <address class="SawTooth"
            attribute="frequency"/>
   <interpolation>1</interpolation>
   <value>550</value>
 </event>
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 <event tick="100" id="3"
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</sequence>
```

```
<parent title="sawtooth_mod"
           xlinktype="simple"
           href="sawtooth_mod.ixd"
           role="InstanceData"
           show="embed" />

<event tick="*" id="*" marker="*">
     <address attribute="frequency"/>
     <value operation="+">10</value>
     <value operation="*">tick</value>
     <value operation="*">0.01</value>
</event>
```

Meta-Data

Tags

- Sequences and Presets may be tagged with semantic information.
- Relations between entities may be created.

Documentation

- Documentation resources may be linked in with Sequence and Preset files.

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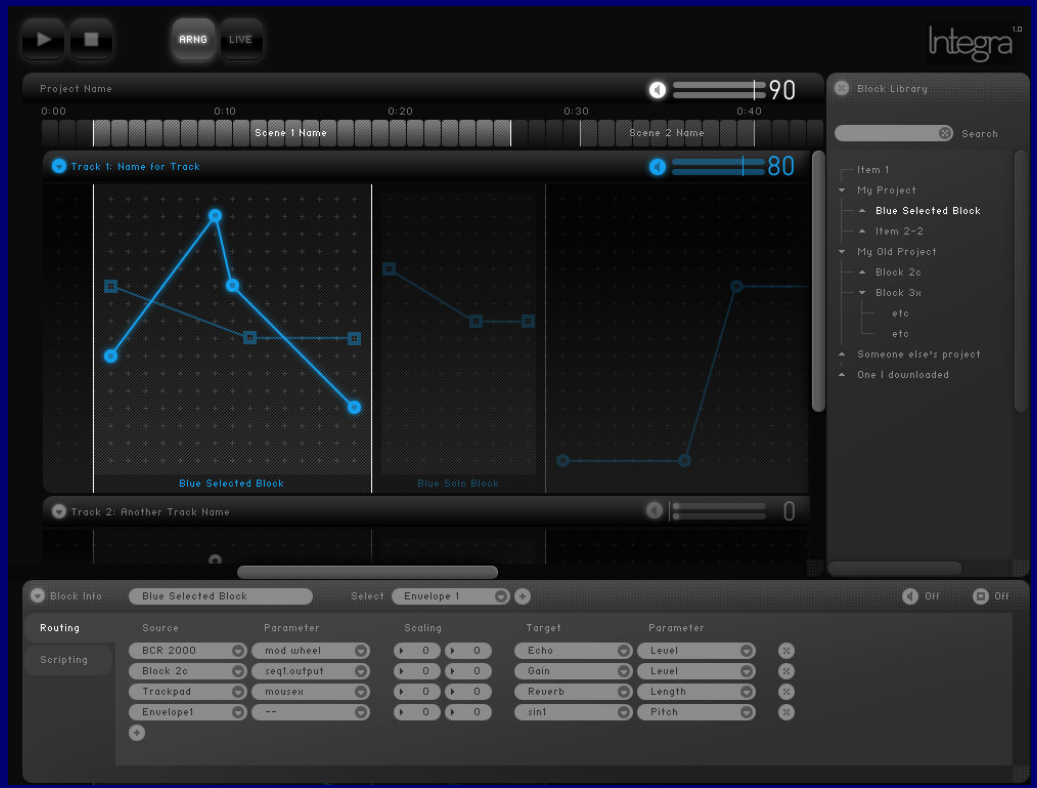

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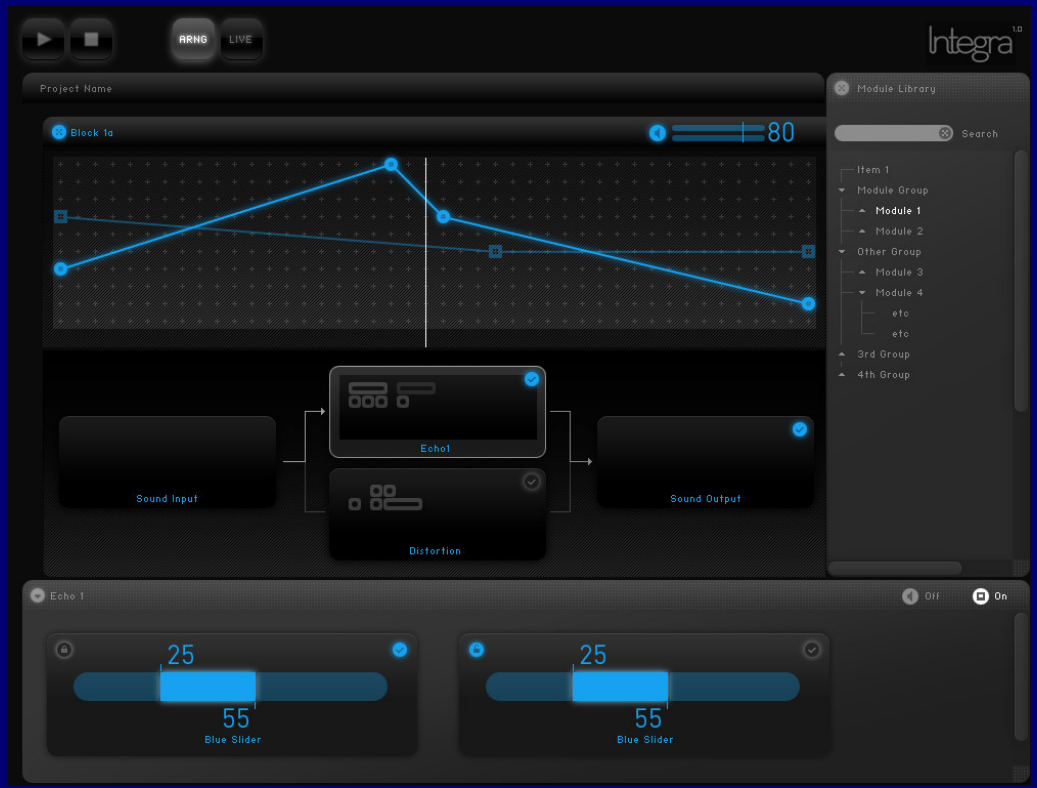

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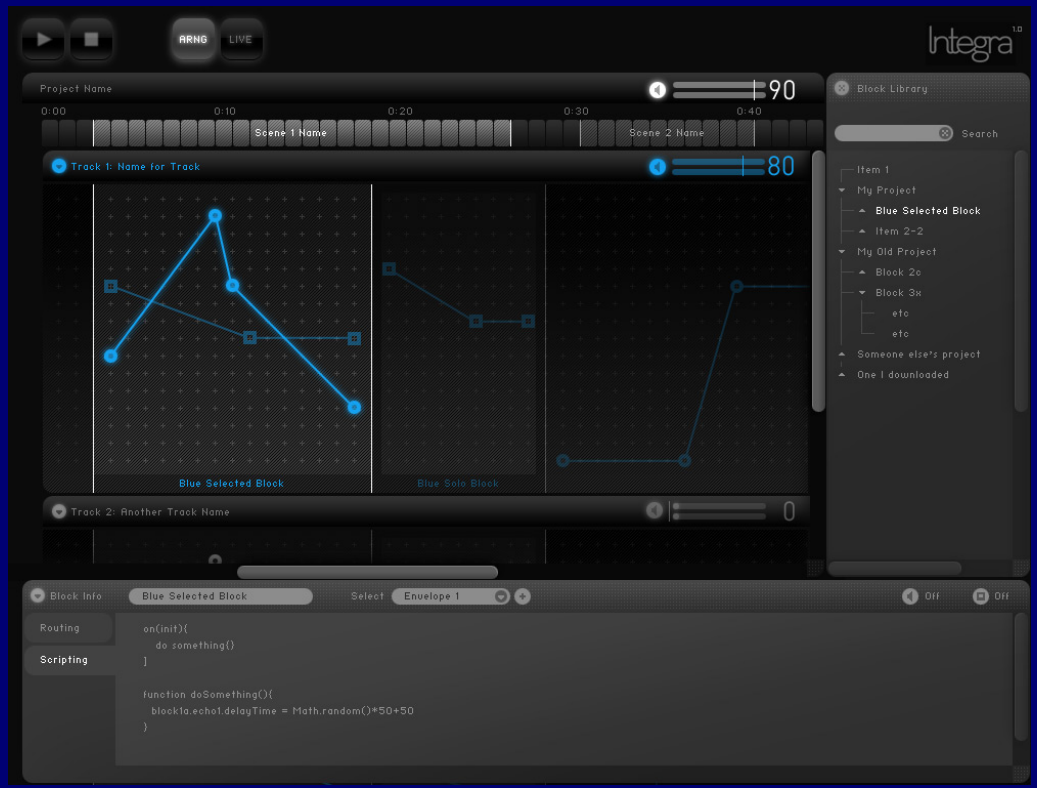

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- Employ semantic richness and sustainability.

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