INScore

AN ENVIRONMENT FOR THE DESIGN OF LIVE MUSIC SCORES

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Linux Audio Conference 2012 - April 12-15 @ CCRMA, Stanford University, CA, USA

Interactive Music Scores

Interactive Music Scores

- Alien Lands - Sandeep Bhagwati
  [Montréal - February 2011]
  Music performance in four movements for four spatially dispersed percussionists with interactive scores.

- Calder's Violin - Richard Hoadley
  [Cambridge - October 2011]
  Automatic music for violin and computer.

The Interlude Project

New Digital Paradigms for Exploration and Interaction of Expressive Movement with Music.

The Interlude Project

INScore

- Music score extension
- Graphic & time spaces relationship
- Performance representation
- Interaction

INScore

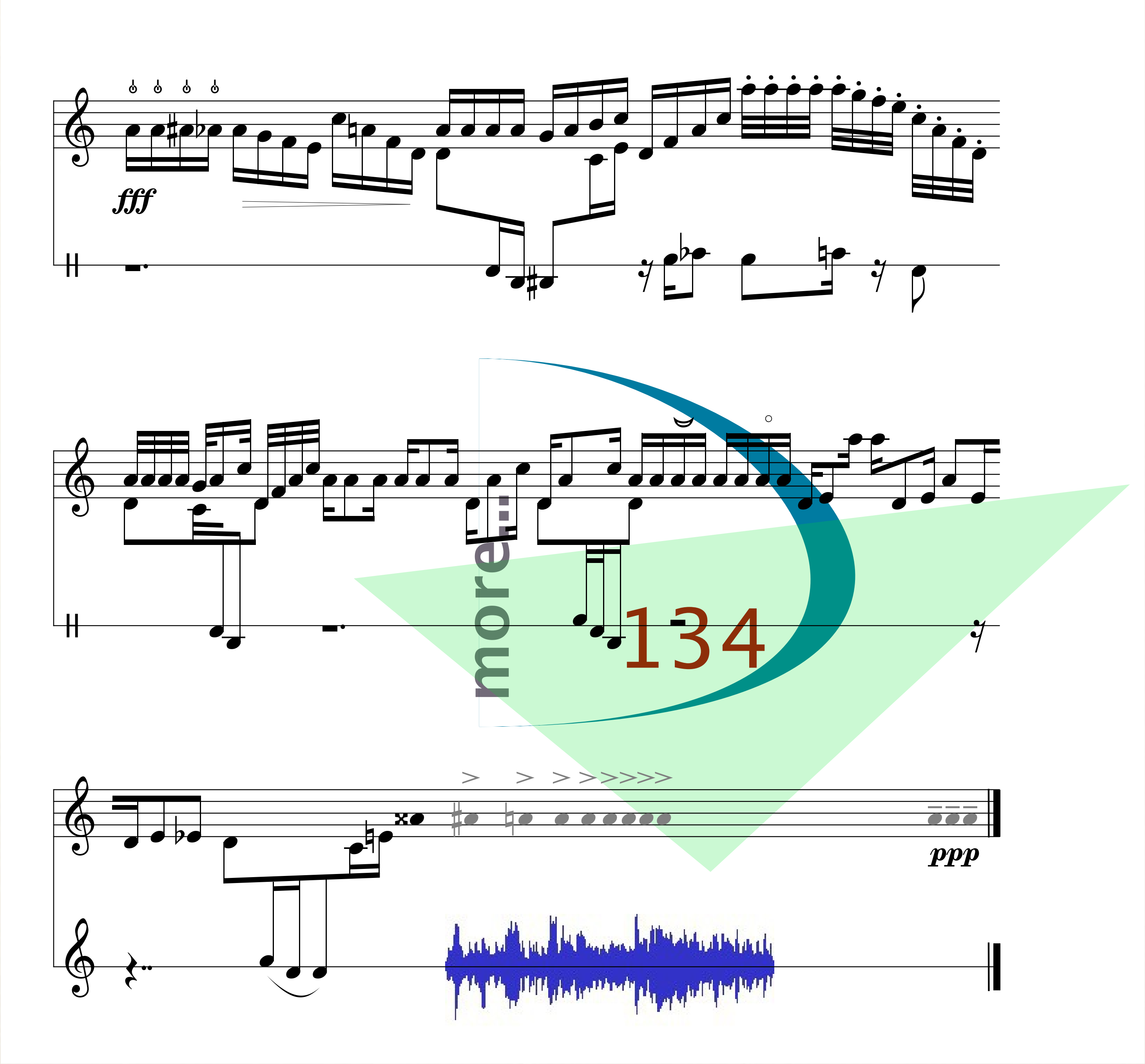
INScore supports

- Symbolic music notation [GMN, MusicXML]
- Textual elements
- Bitmaps [jpg, gif, tiff, png,...]
- Vectorial graphics (rectangles, ellipses, SVG,...)
- Video files
- Sound and gesture graphic representations

INScore is

- a standalone score viewer
- an open source C/C++ library
- multi-platform
- an Open Sound Control API

INScore



Relations between graphic and time space

Hypothesis

Approach the problem with segmentation and relations between segments

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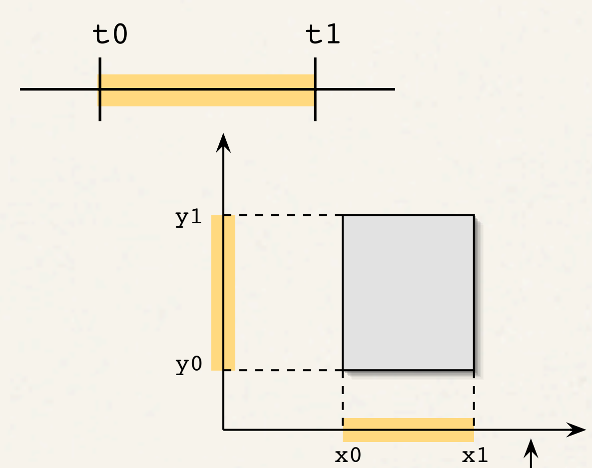
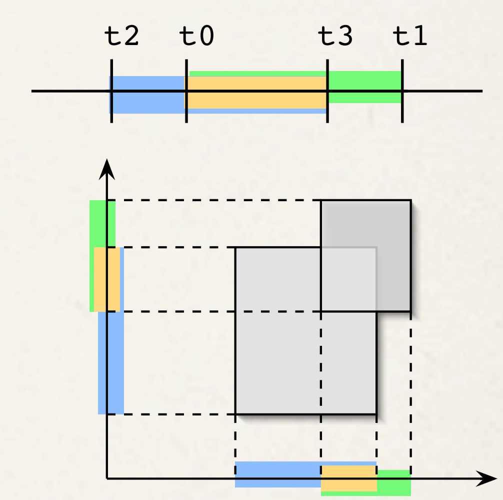
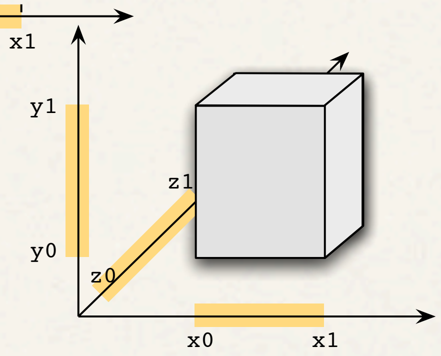




Segments

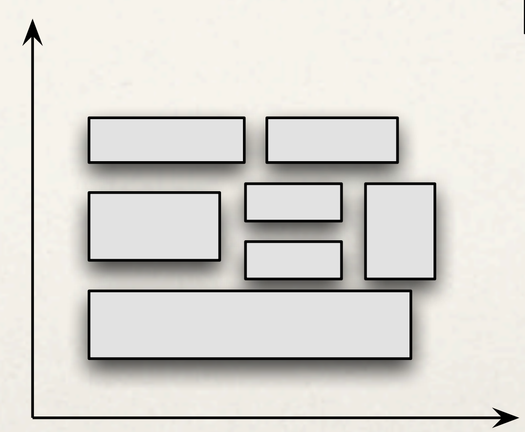
Defined as a list of intervals:

- generalizable to n dimensions
- intersection operation



Segmentation

A set of disjoined segments



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Mapping

Relation between two segmentations:

- operations to query the mapping
- operations to compose mappings

Relations between graphic and time space

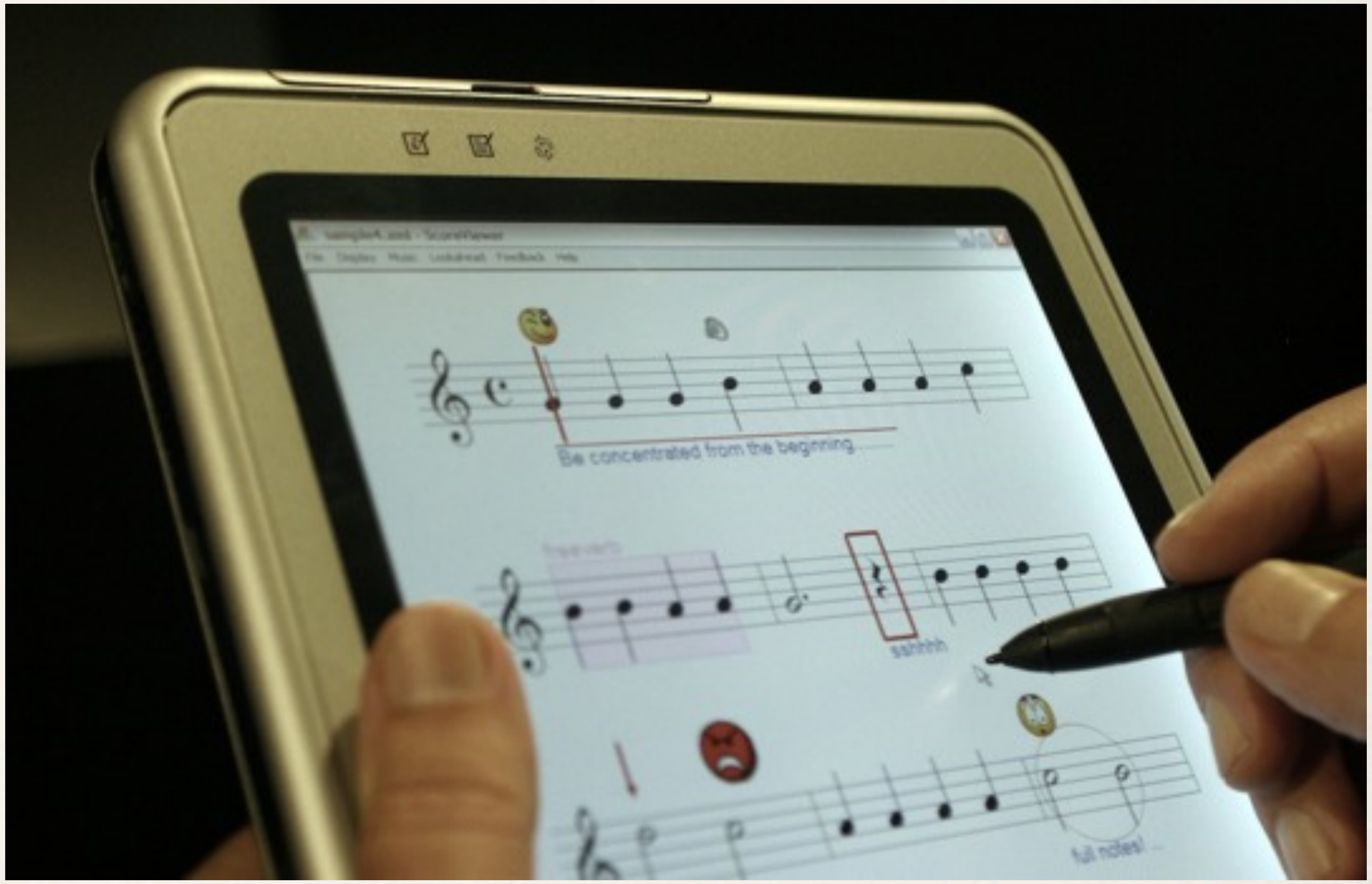
Segmentations and mappings for each component type:

type	segmentations and mappings required
text	*graphic* ↔ **text** ↔ **relative time**
score	*graphic*↔ *wrapped relative time* ↔ *relative time*
image	*graphic* ↔ **pixel** ↔ **relative time**
vect. graphics	**vectorial**↔ **relative time**
signal	*graphic* ↔ **frame** ↔ **relative time**

Performance representation

The VEMUS approach

- a mirror metaphor
- feedback based pedagogy
- score annotation with performance representations



Performance representation

The VEMUS approach

- a mirror metaphor
- feedback based pedagogy
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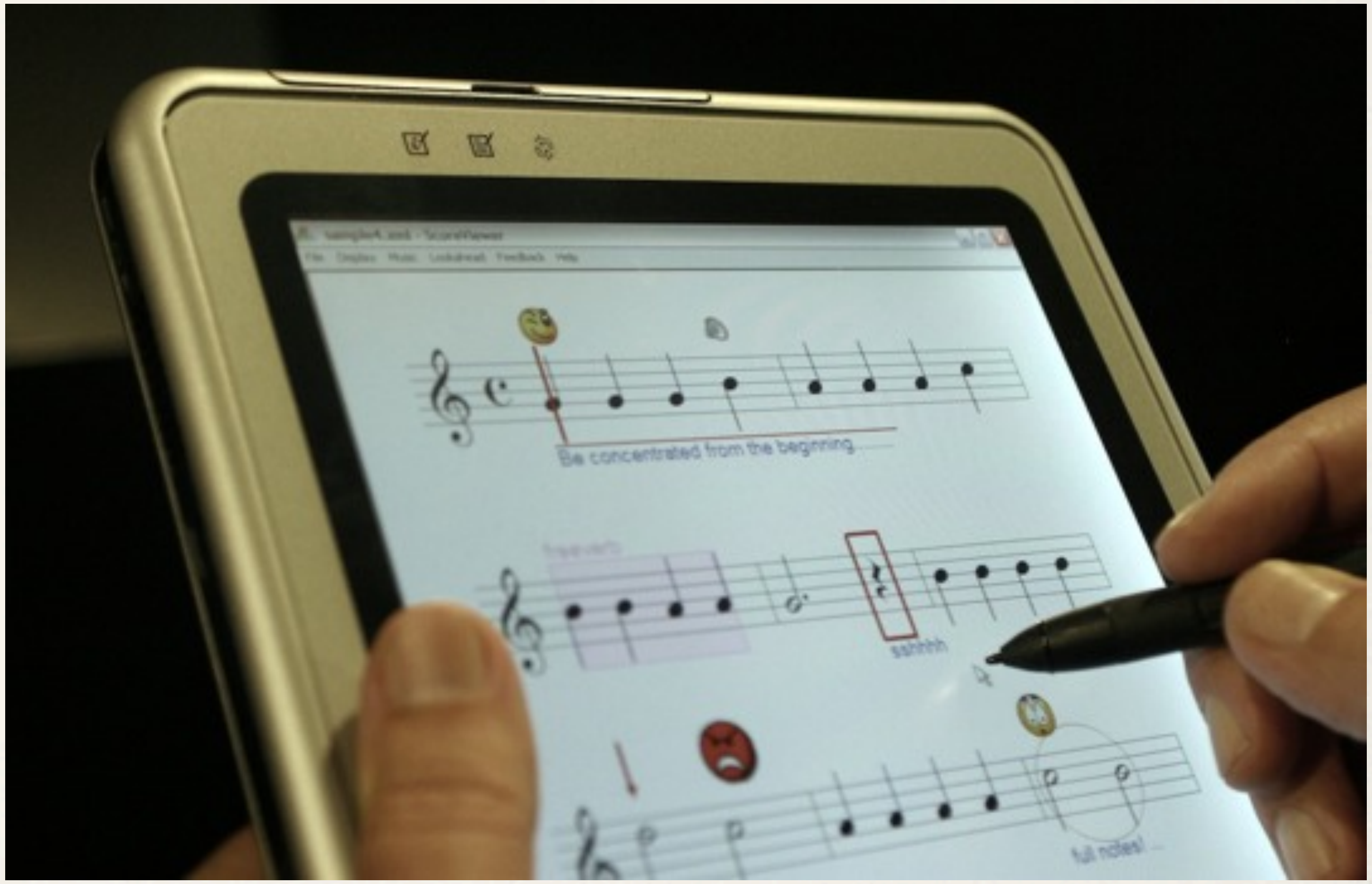
- static design,
- tricky to extend,
- awkward to experiment.



Performance representation

Hypothesis

Approach the graphic of a signal as a *graphic signal*.

Performance representation

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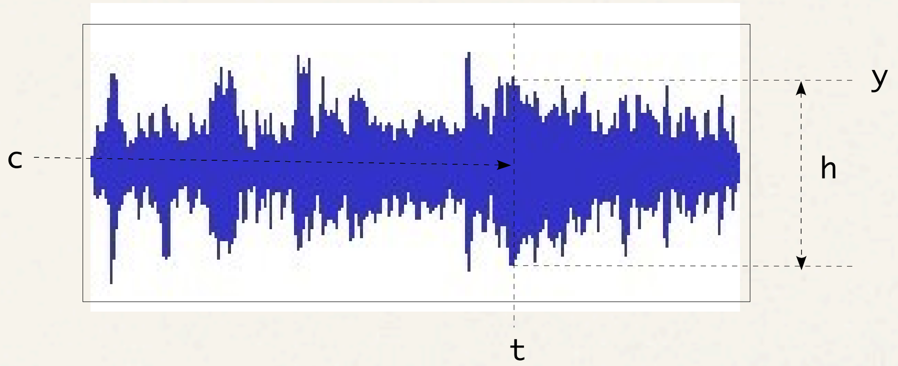
A graphic signal

A composite signal made of:

- a y signal
- a thickness signal
- a color signal



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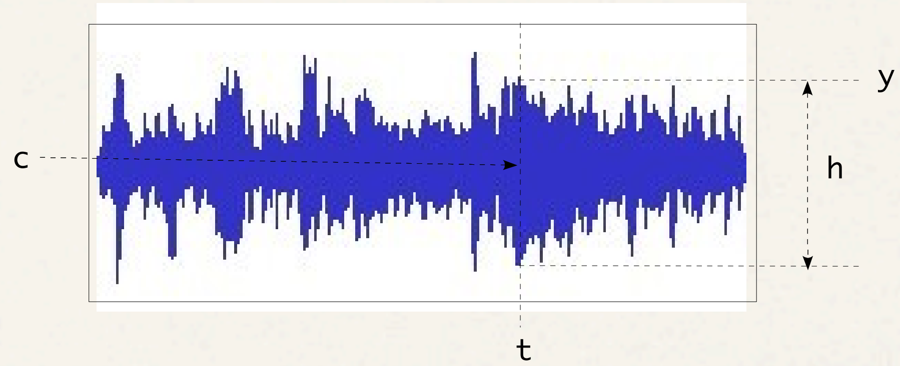

Consider a signal S defined as a time function: $f(t) : \mathbb{R} \rightarrow \mathbb{R}^3 = (y, h, c) \mid y, h, c \in \mathbb{R}$

This signal could be directly drawn (i.e. without additional computation)

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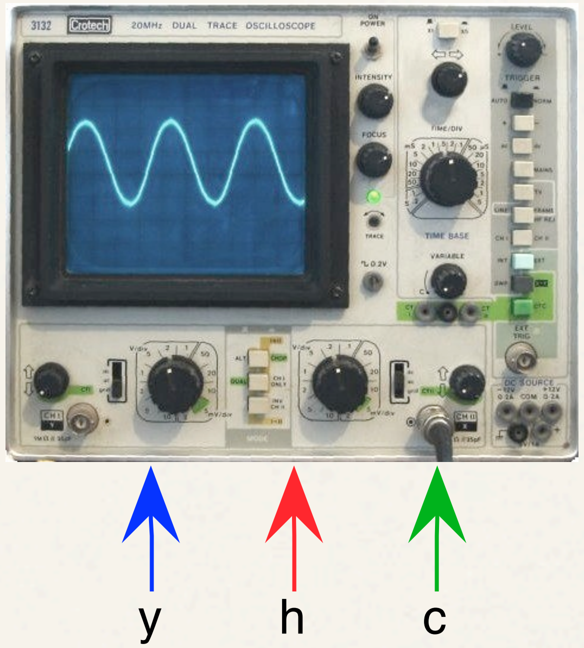

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Performance representation
System expressivity

Examples

$g = S_{f0} \ / \ k_t \ / \ k_c$

S_{f0} : fundamental frequency

k_t : constant thickness signal

k_c : constant color signal

Performance representation
System expressivity

Examples

$g = k_y \ / \ S_{rms} \ / \ k_c$

S_{rms} : RMS signal

k_y : constant y signal

k_c : constant color signal

Performance representation
System expressivity

Examples

$g = S_{f0} \;/\; S_{rms} \;/\; k_c$

S_{rms} : RMS signal

S_{f0} : fundamental frequency

k_c : constant color signal

Performance representation
System expressivity

Examples

$g0 = S_{f0} \;/\; S_{rms0} \;/\; k_c0$

S_{f0} : fundamental frequency

S_{rms0} : f0 RMS values

$g1 = S_{f0} \;/\; S_{rms1} + S_{rms0} \;/\; k_c1$

S_{rms1} : f1 RMS values

$g2 = S_{f0} / \; S_{rms2} + S_{rms1} + S_{rms0} \;/\; k_c2$

S_{rms2} : f2 RMS values

...

$g = g2 \;/\; g1 \;/\; g0$

INScore OSC Messages

An «object oriented» approach

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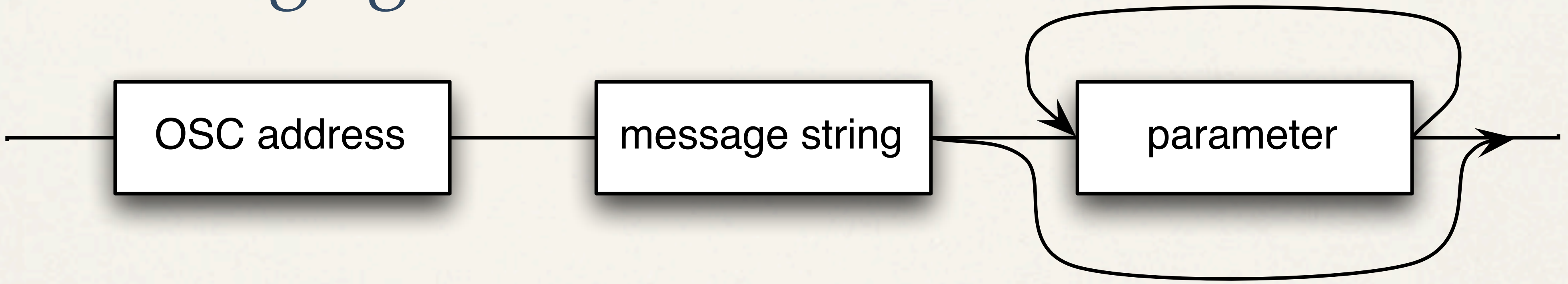
An «object oriented» approach

- The OSC address is like an object pointer.
- An OSC message is similar to an object method call.
- The OSC address space is dynamic.

OSC message general format



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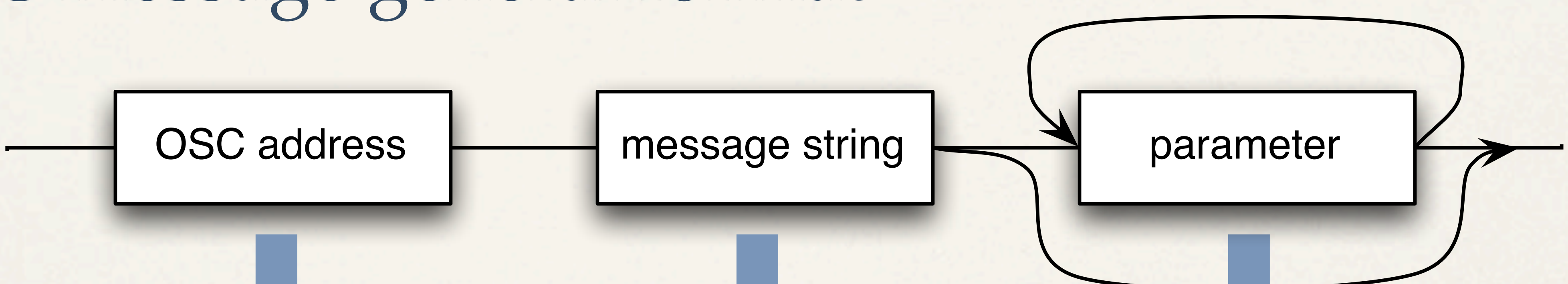
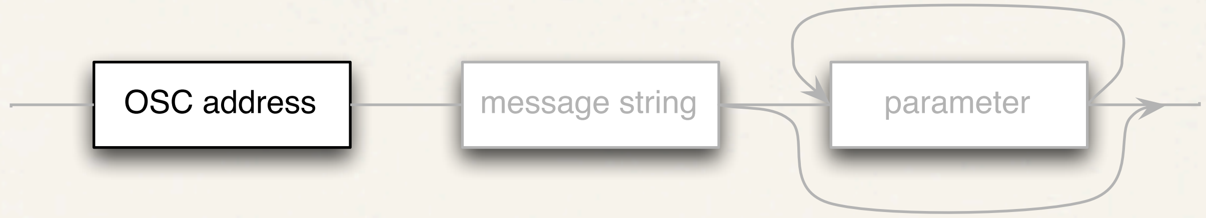


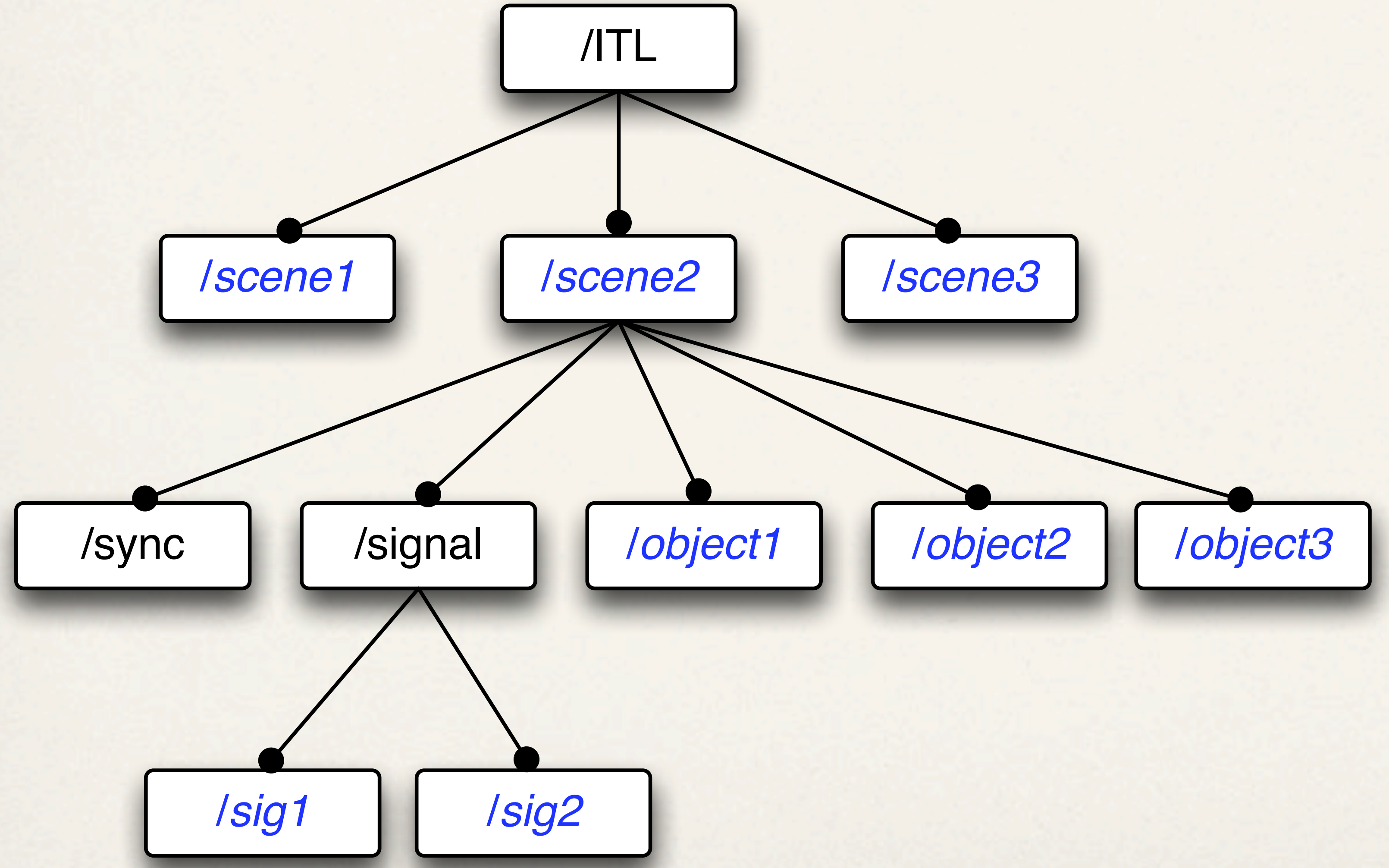
Example

```
/ITL/scene/score   color    255 128 40 150

       score->color(255, 128, 40, 150)
```

INScore OSC Address Space





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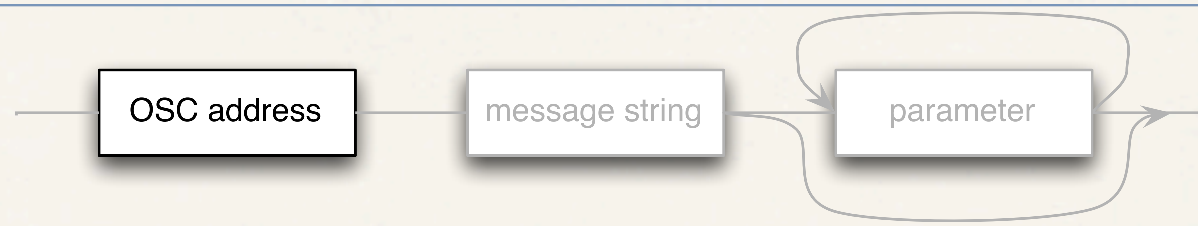

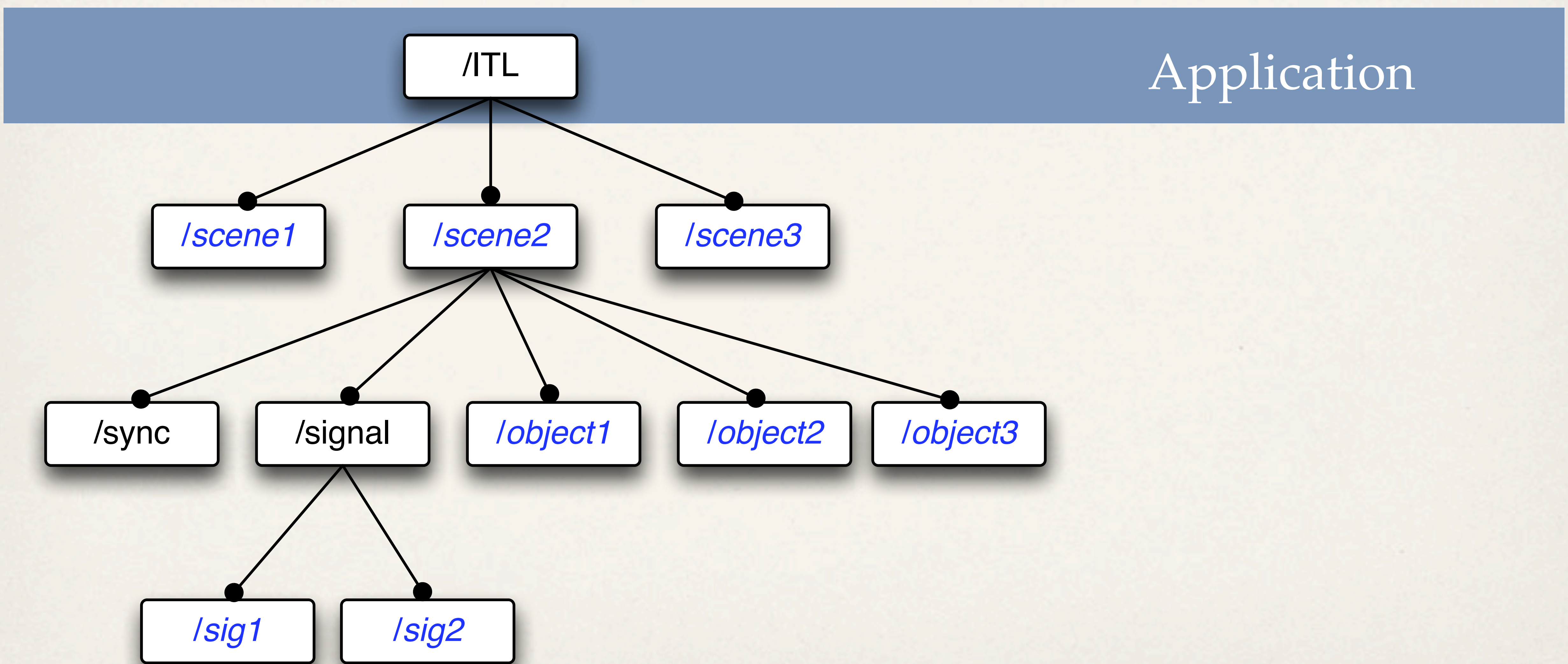

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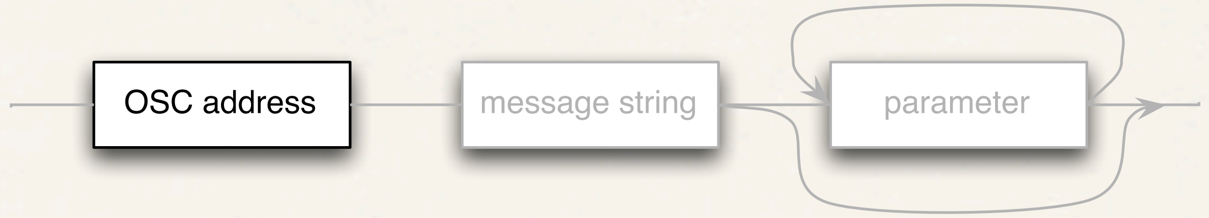

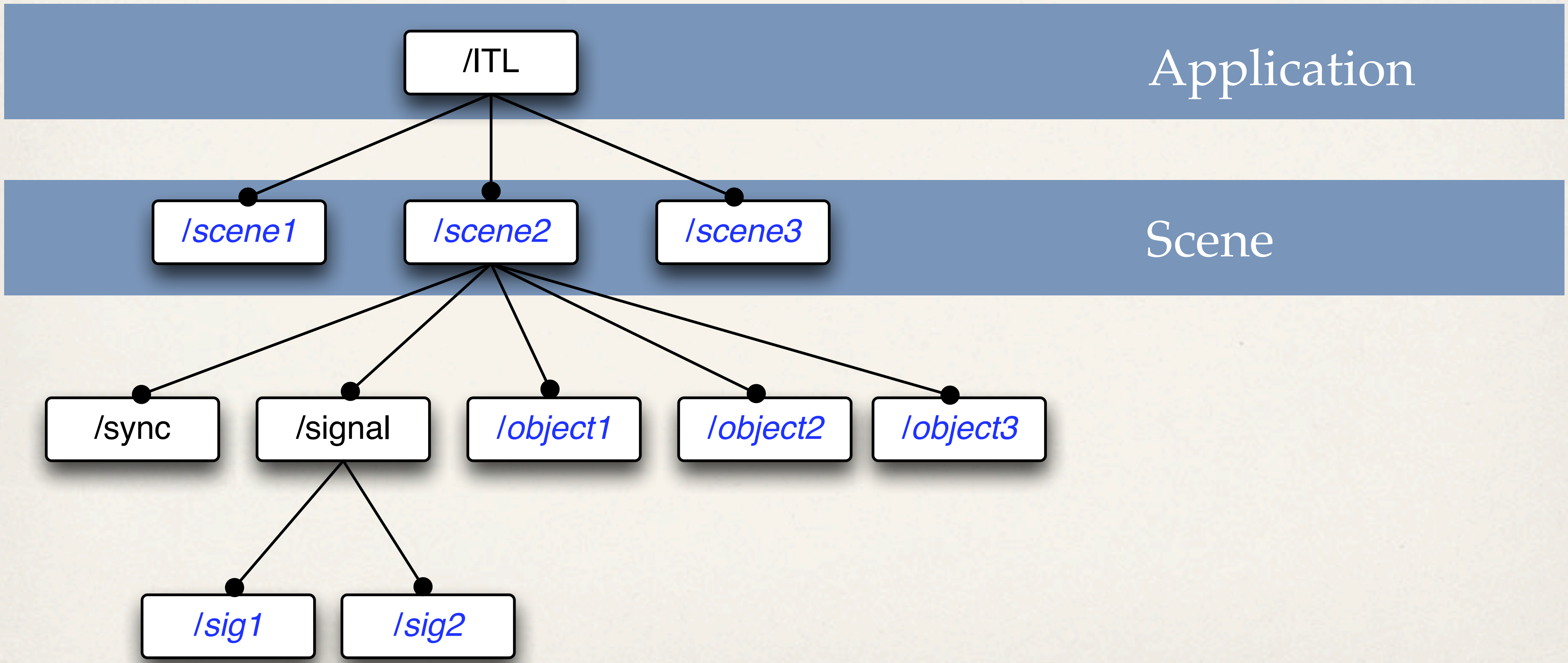

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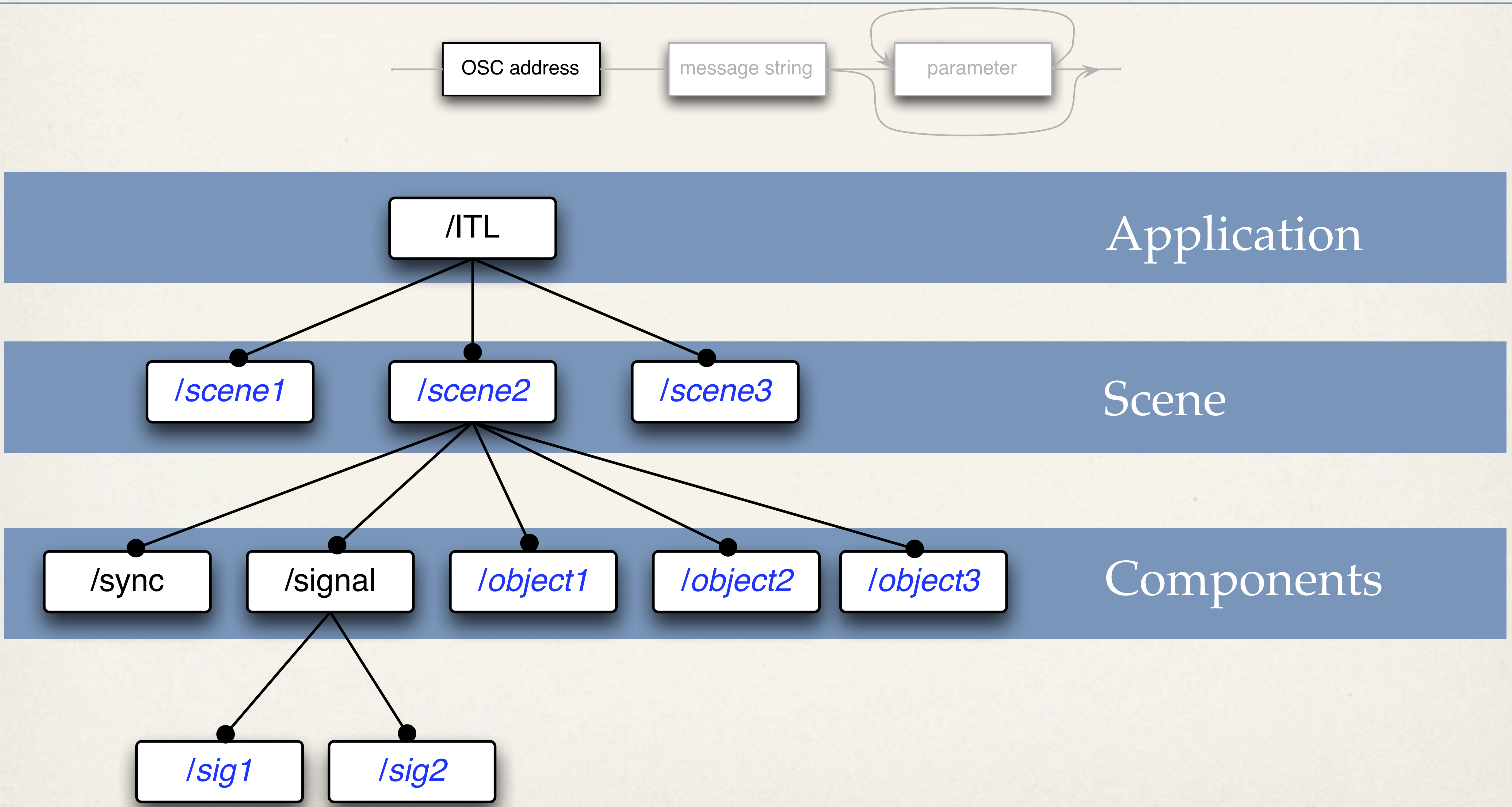

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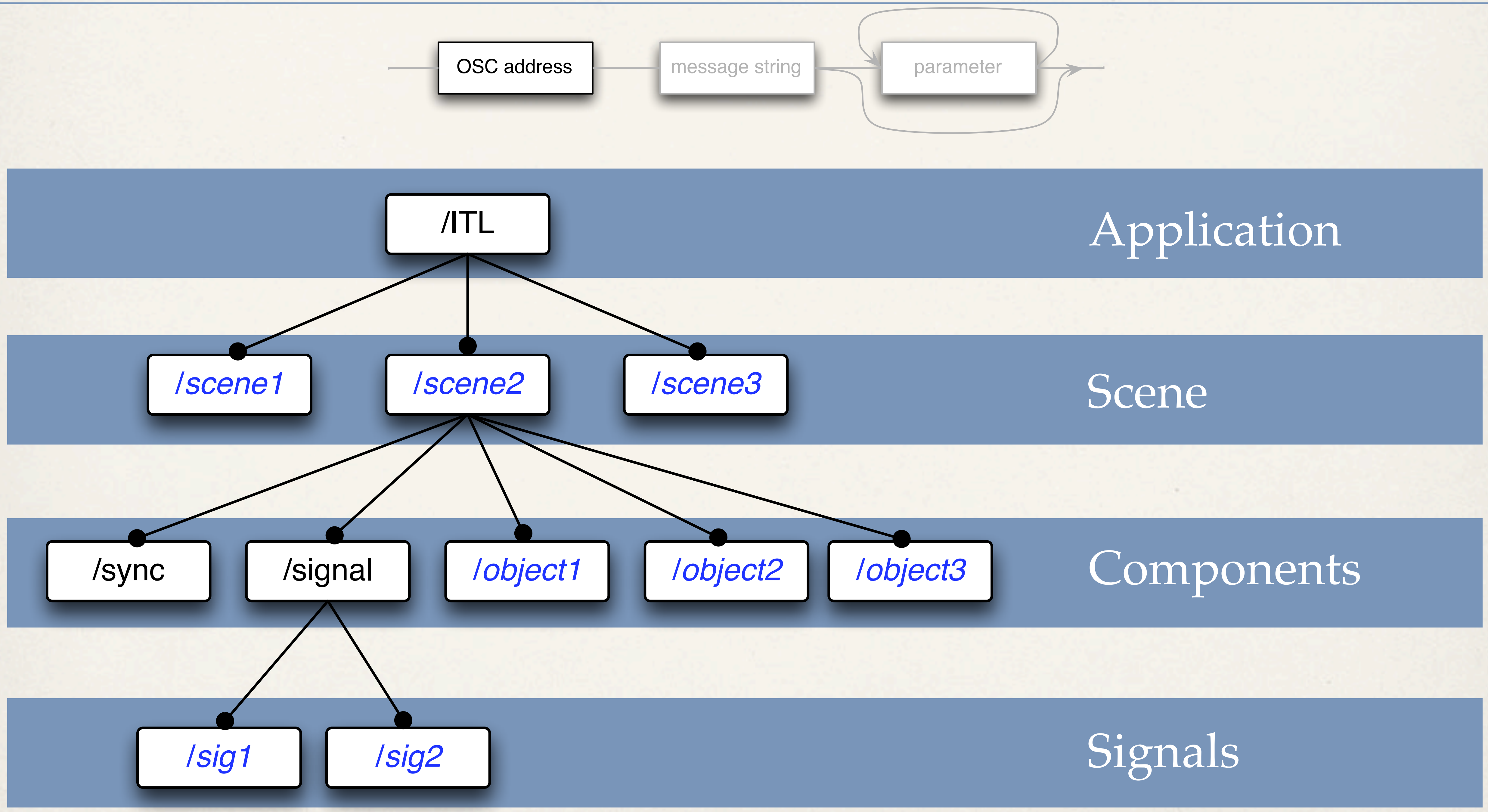
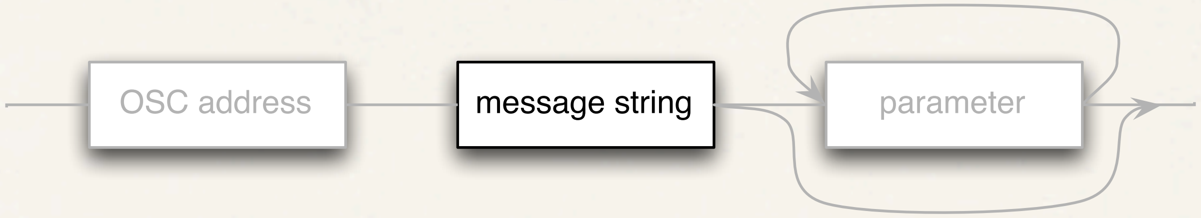


Messages Strings



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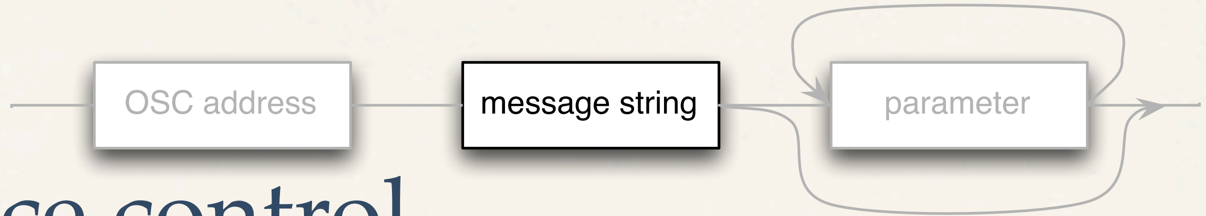


Graphic space control

- Position:
  `x, y, z, angle, scale, dx, dy, dz, dangle, dscale`
- Color:
  `color, dcolor, red, green, blue, dred, dgreen, dblue, alpha, dalpha, hue, saturation, brightness, dhue, dsaturation, dbrightness`

Time space control

- Time position:
  `date, ddate, clock`
- Duration:
  `duration, dduration`

Constructor

- `set`

Query message

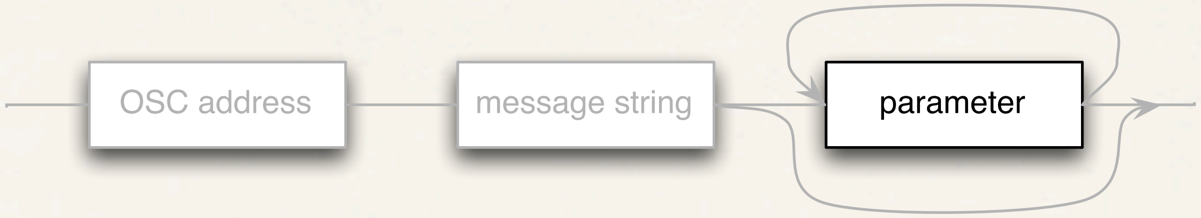
- `get`

Time and graphic spaces relations

- `map`

Signals and graphic signals messages

Messages Parameters



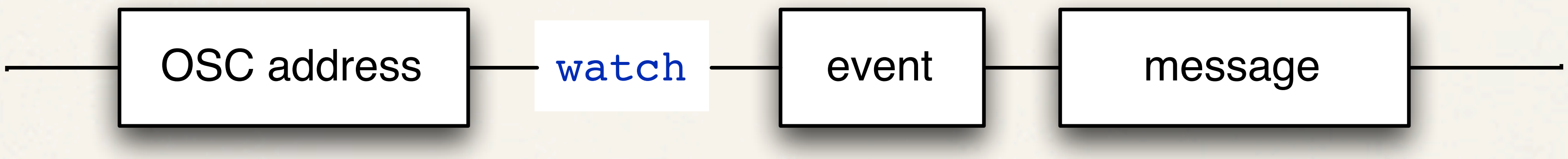
Direct use of basic OSC types

- `int32`
- `float32`
- `OSC-string`

Relaxed types but strict parameters count

Interaction Messages

Basic principle



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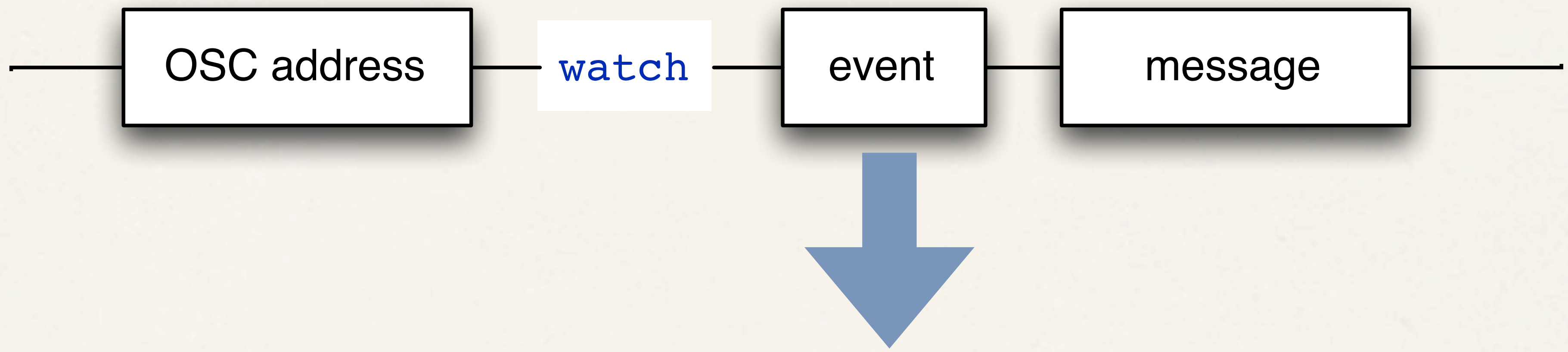

- mouse up, mouse down, mouse move, mouse enter, mouse leave ...
- time enter, time leave

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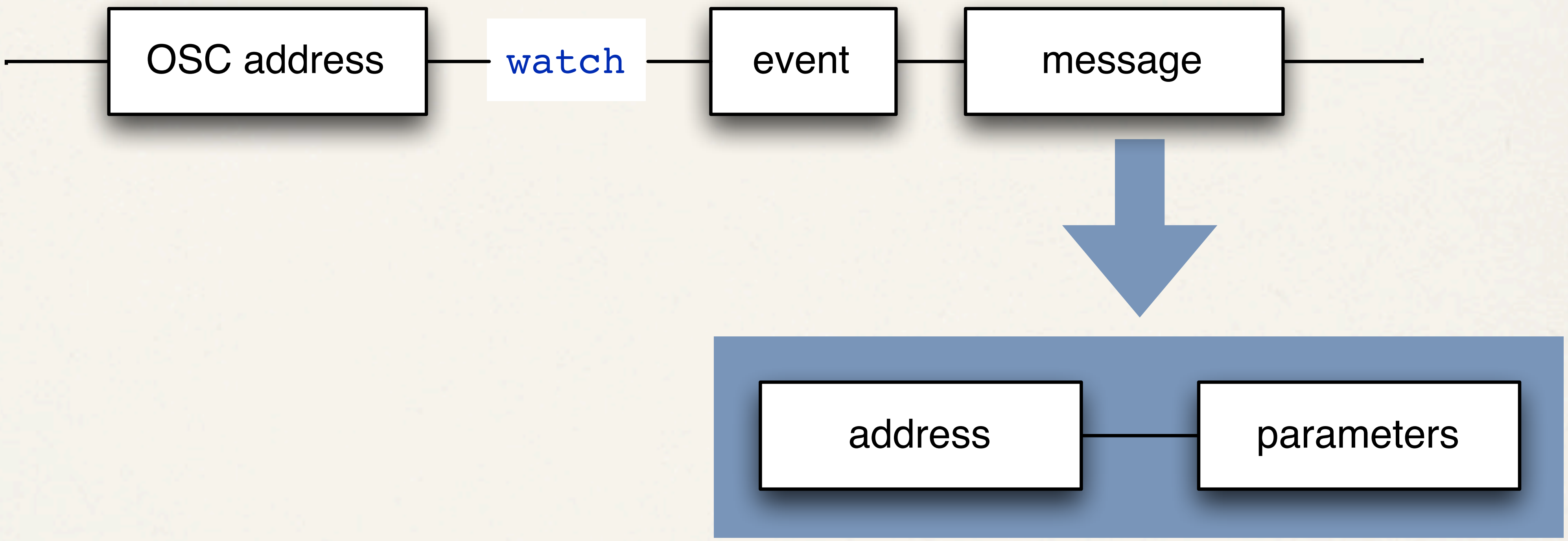

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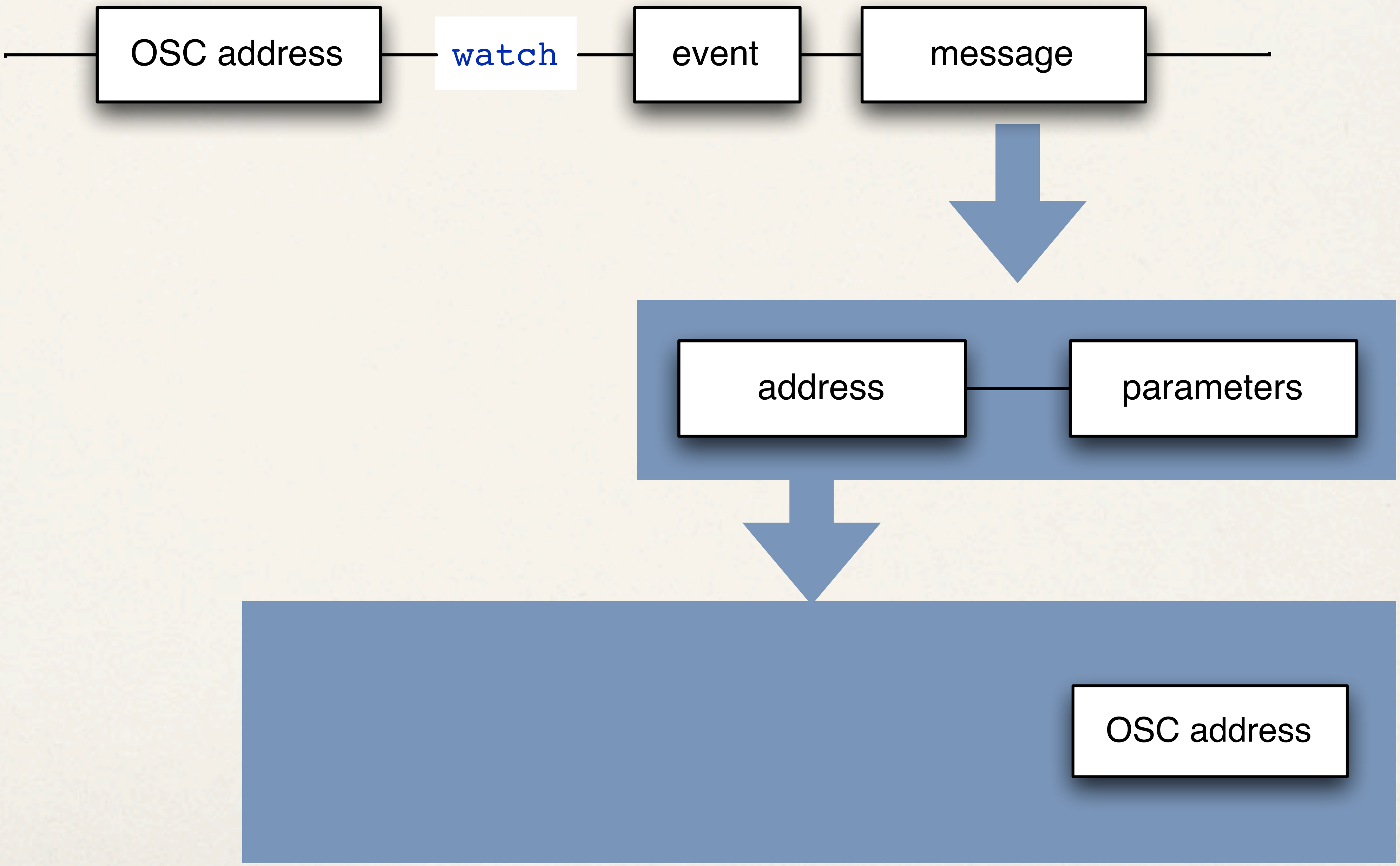

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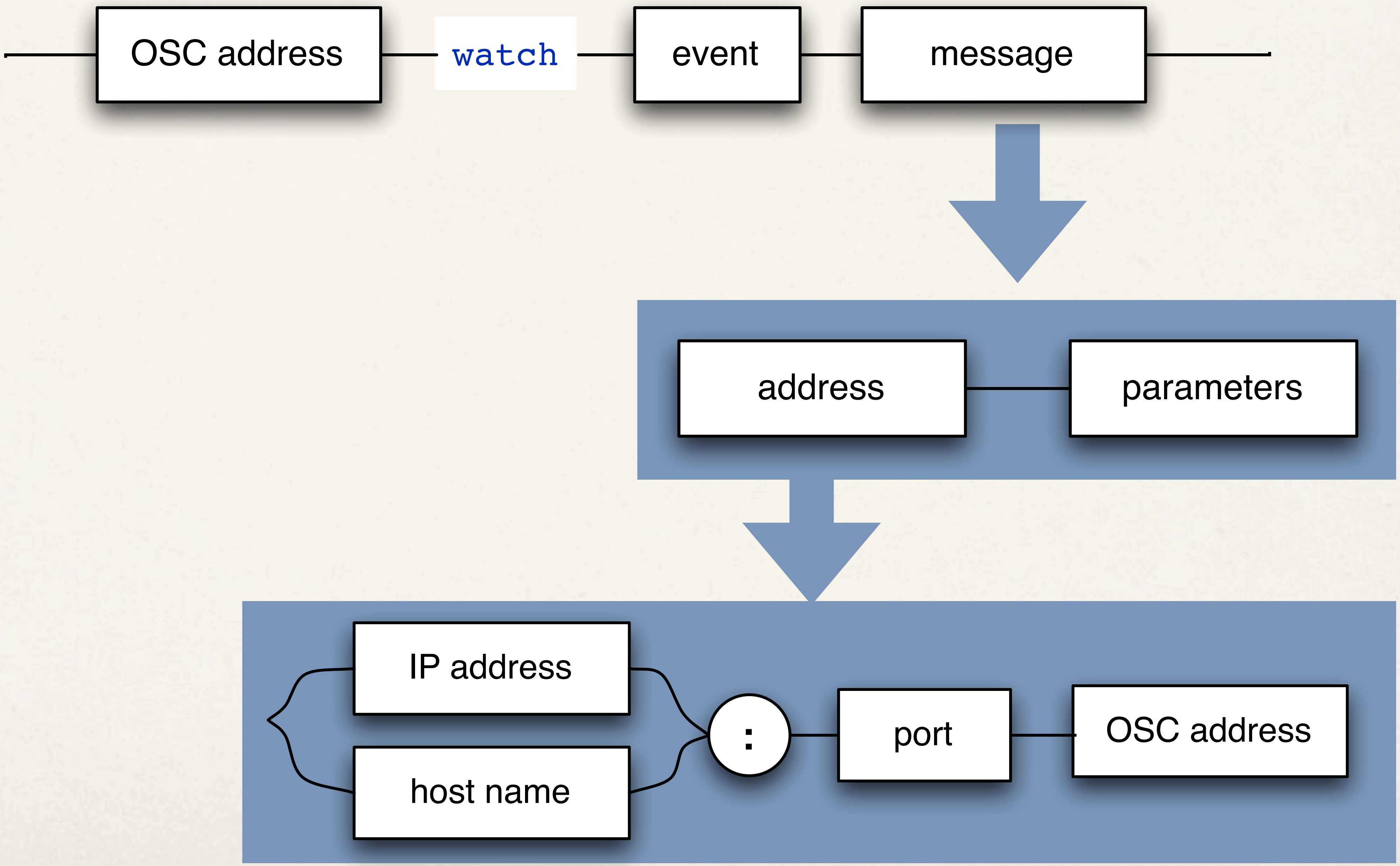

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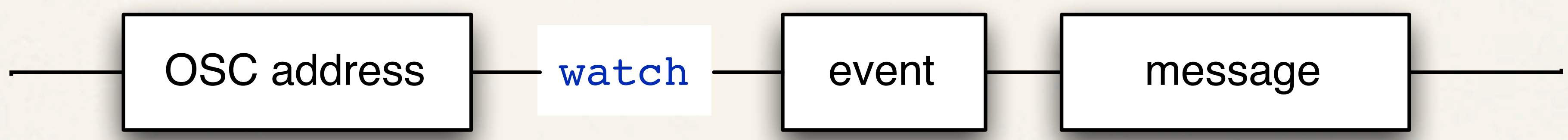

Examples

```
/ITL/scene/myObject watch mouseDown /ITL/scene/myObject show 0
```

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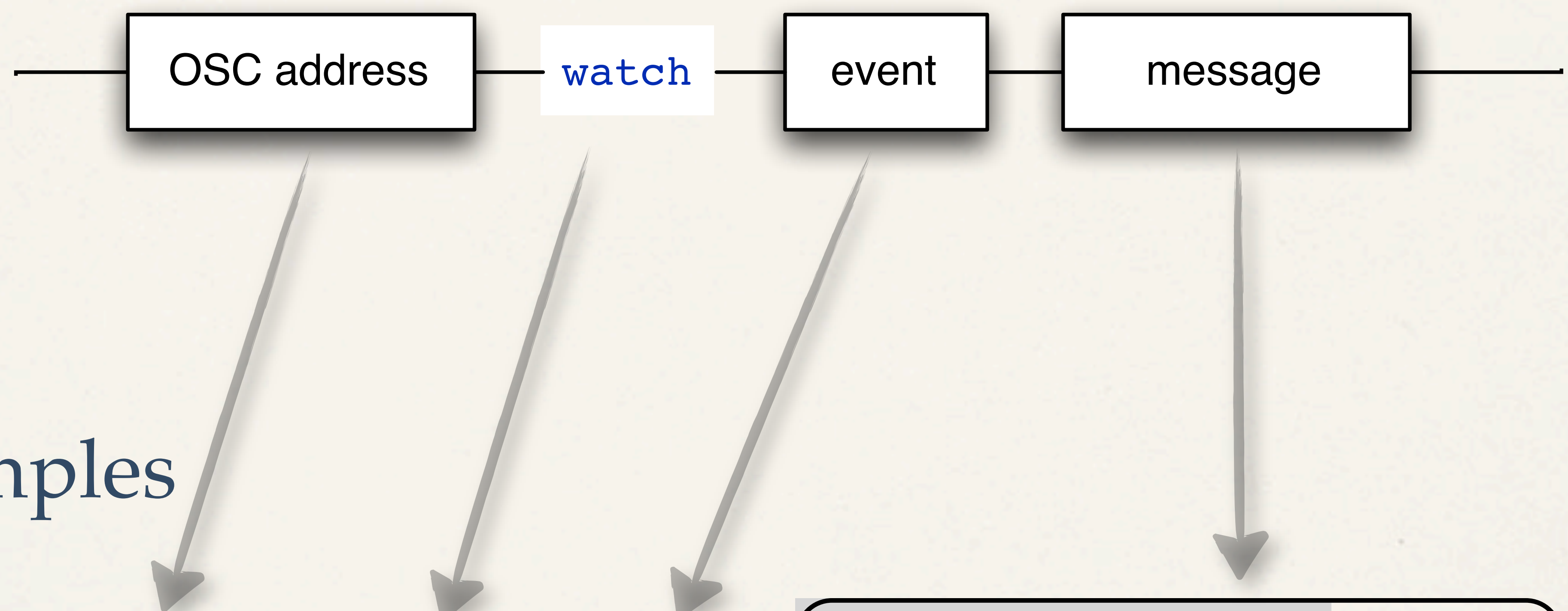

Examples

```
/ITL/scene/myObject watch mouseDown /ITL/scene/myObject show 0
/ITL/scene/myObject watch mouseDown host.domain.org:12100/an/address start
```

Interaction Messages

Variables

- `$x, $y, $absx, $absy, $sx, $sy`
- `$date`

Address variables

- `$self`
- `$scene`

Message based variables

- `$(a valid INScore ‘get’ message)`

Scaling variable values

- `$x[min, max], $y[min, max]`

Date quantification

- `$date[n/d]`

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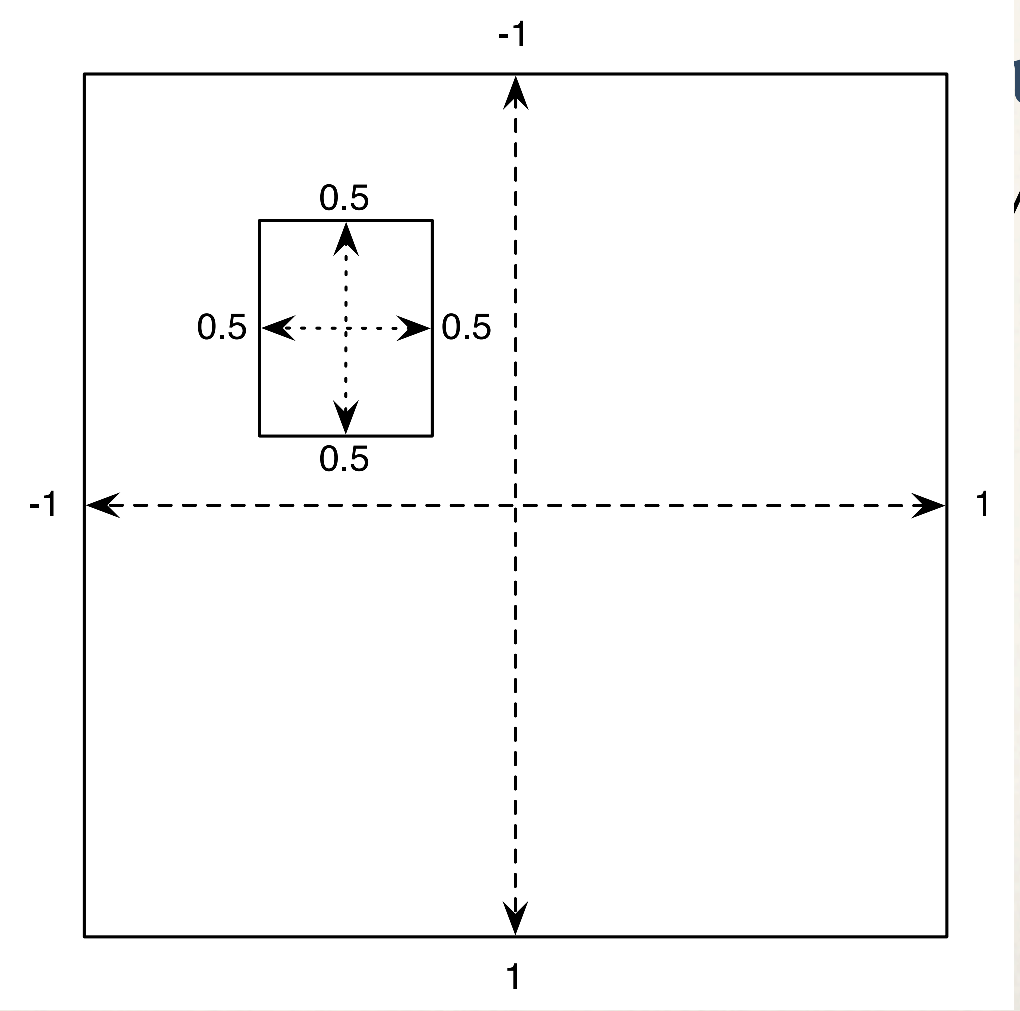

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Scripting

- INScore files as script files.
- Supports variables
- Javascript support (embedded by default)

```
<?javascript   ... any javascript code ... ?>
```

- optional Lua support (not embedded by default)

```
<?lua   ... any lua code ... ?>
```

http://inscore.sourceforge.net