



Programming for Ginga-NCL

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Programming in NCL Conceptual Model

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Basic Entities

what? nodes (media objects)

how? node's properties

where? node's properties

when? links and connectors

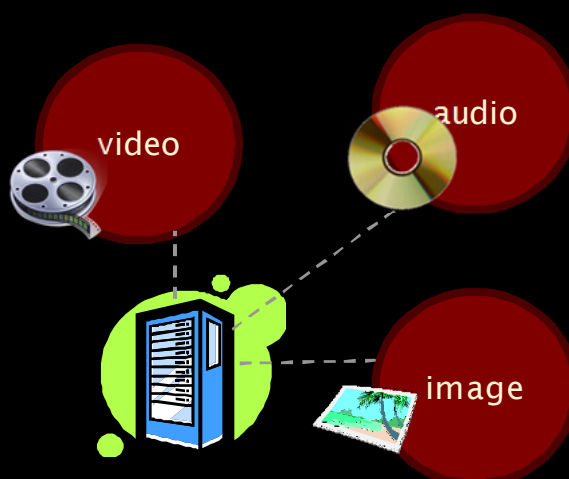


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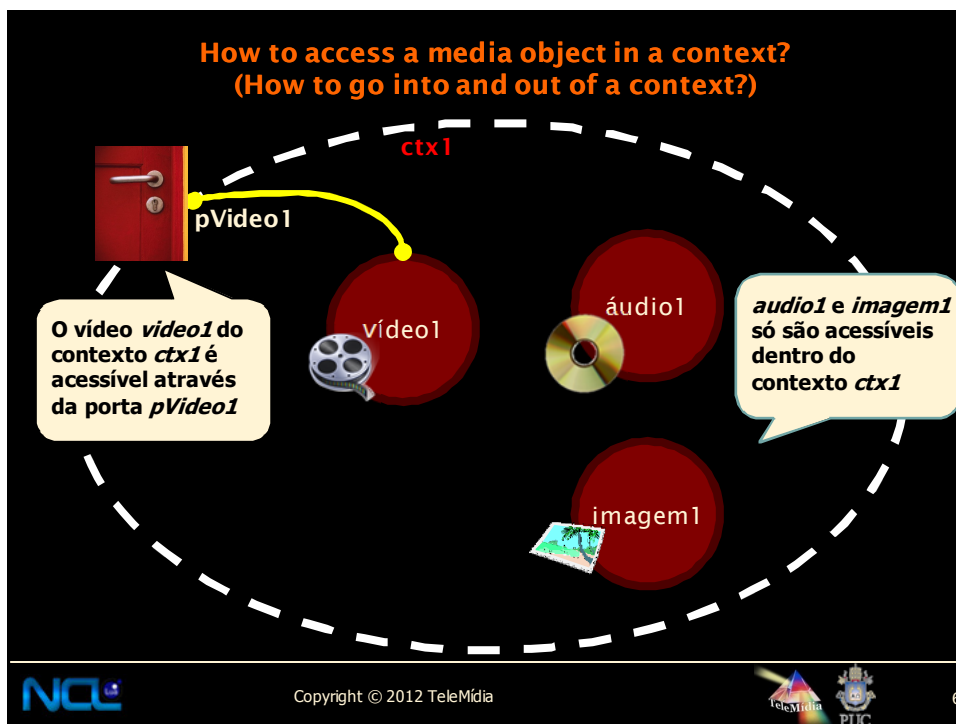
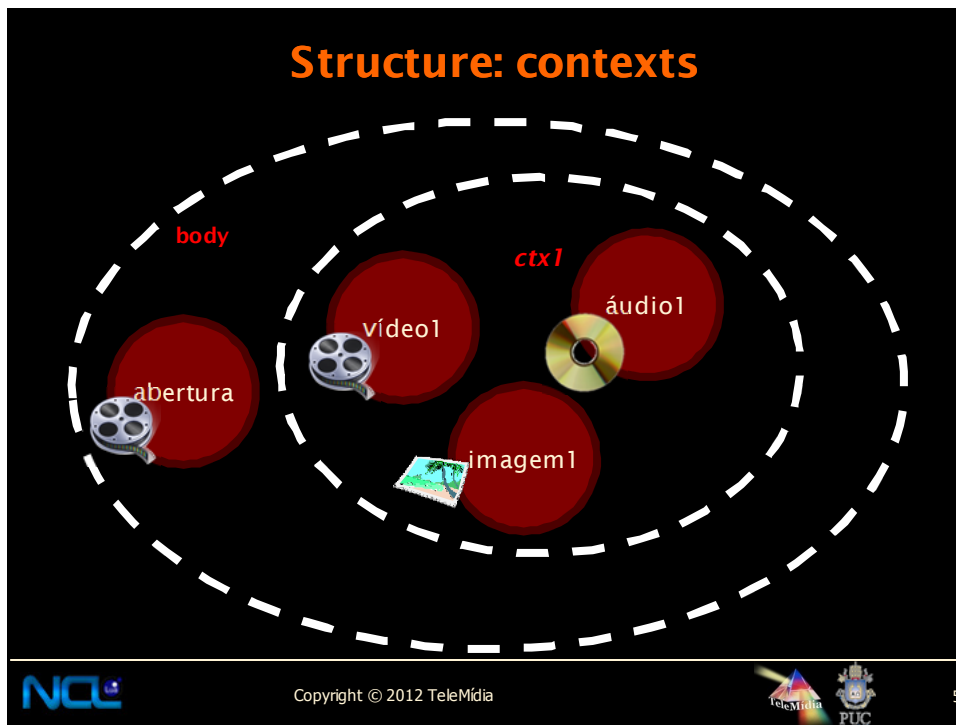
What? Media Objects



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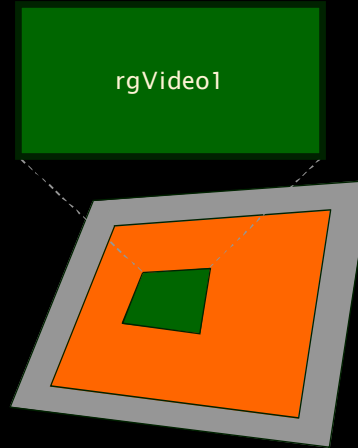


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Where?

Regions
on a specific device

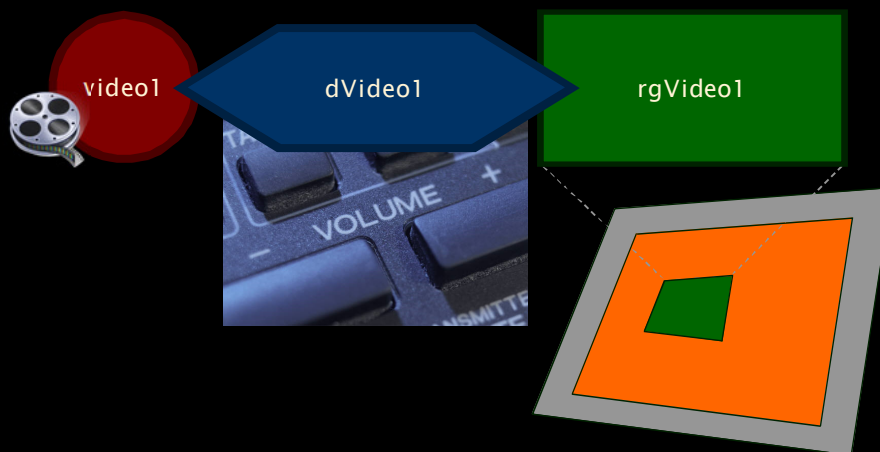


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How?

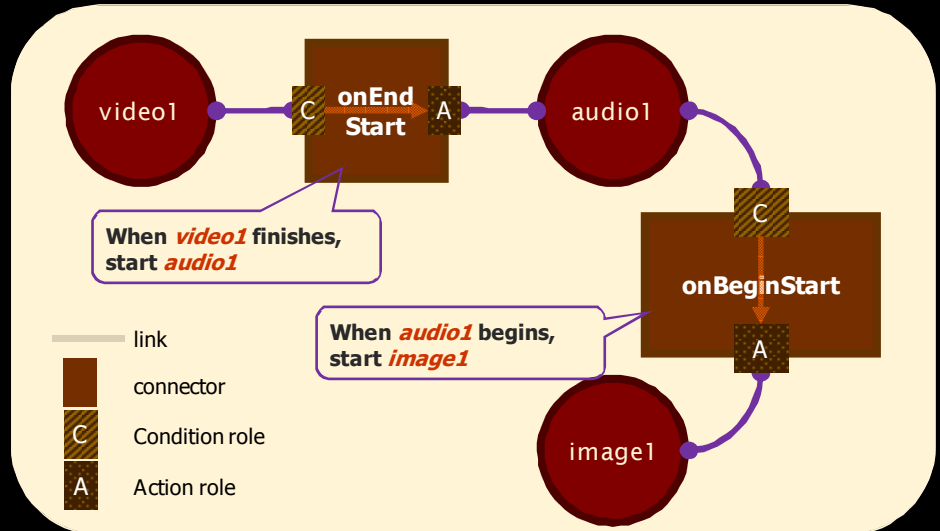


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When? Links and connectors



Programming in NCL

The Language

Designing an NCL Document

- visions
 - spatial/temporal (storyboard)
 - structural
 - layout
 - temporal



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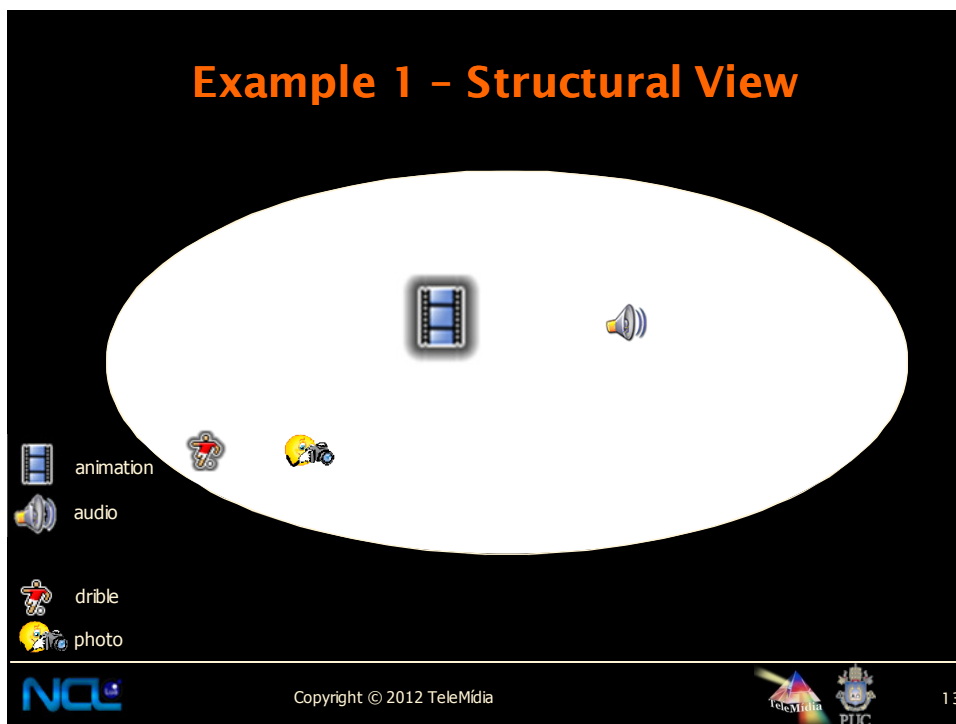
Example 1 – Storyboard



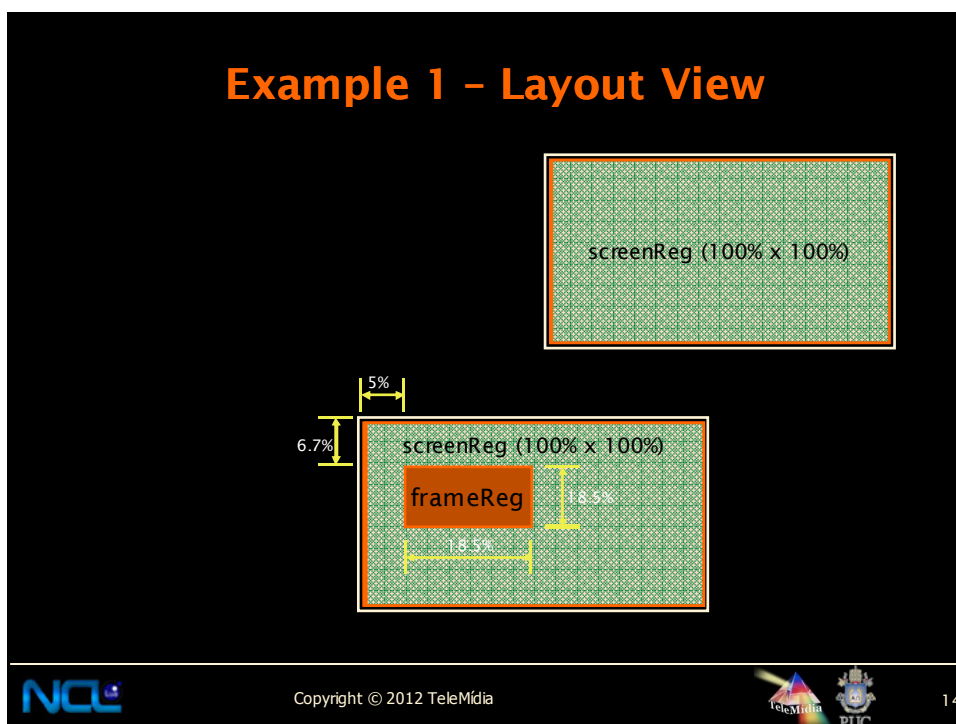
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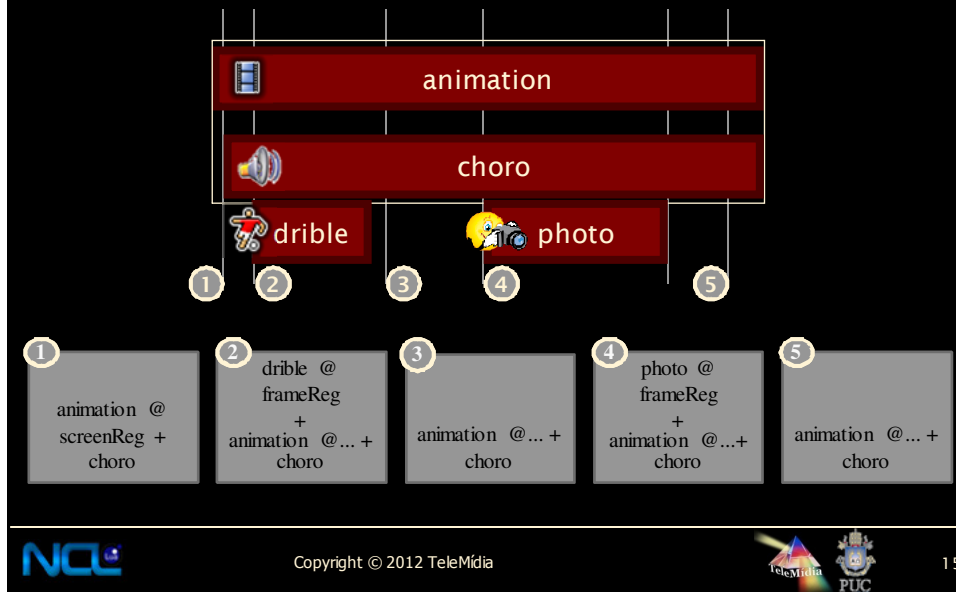
Example 1 - Structural View



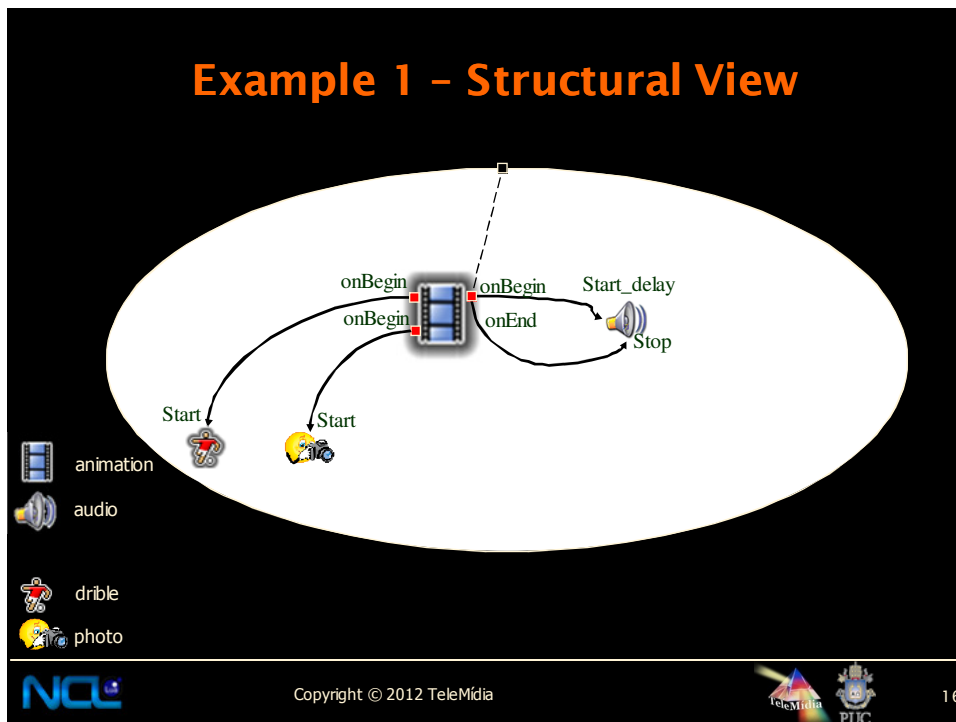
Example 1 - Layout View

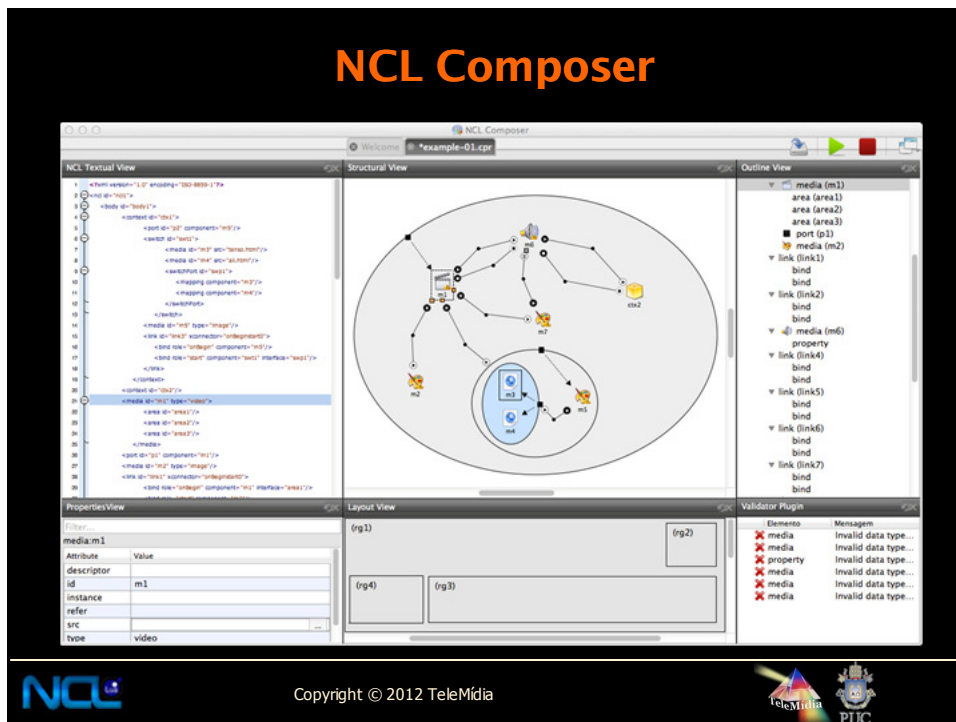
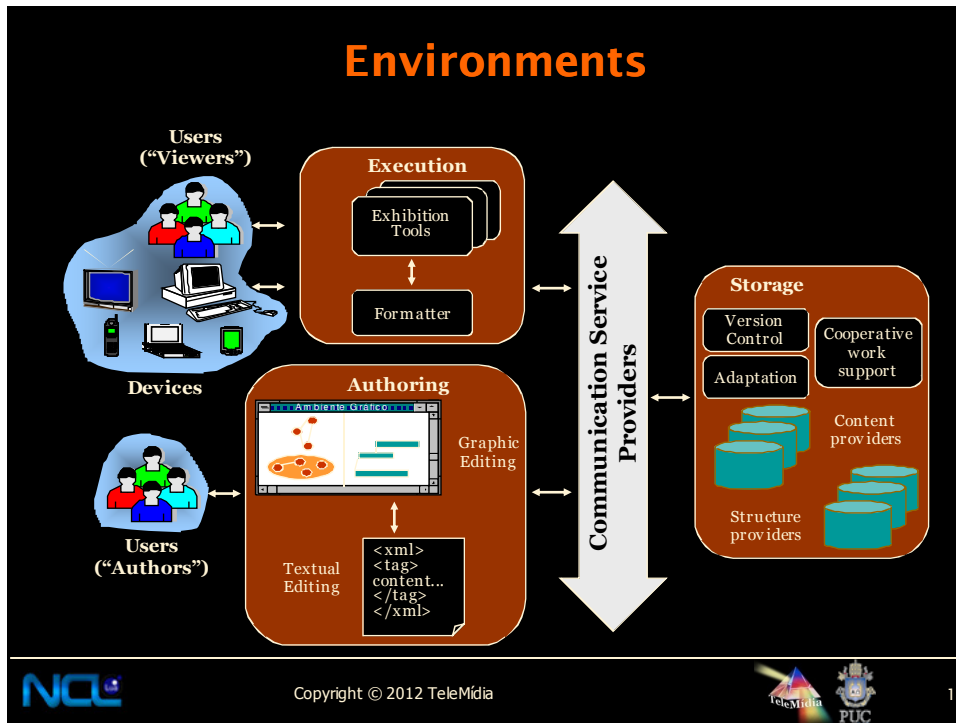


Example 1 - Temporal View



Example 1 - Structural View





NCL Eclipse

The screenshot shows the Eclipse IDE with a Java Type Hierarchy on the left and an NCL editor in the center. The NCL code defines a screen with regions and descriptors. Below the editor, the Console window displays four error messages:

```
Errors (4 items)
- [Error] Page1 <var> nDio definido no elemento <connector (conEx:forBeginWarStat)>
- [Error] Page1 <var> nDio definido no elemento <connector (conEx:forBeginWarStat)>
- [Error] Page1 <var> nDio definido no elemento <connector (conEx:forBeginWarStat)>
- [Error] Page1 <var> nDio definido no elemento <connector (conEx:forBeginWarStat)>
```

The bottom of the slide features the NCL logo, the text "Copyright © 2012 TeleMídia", and logos for TeleMídia and PUC. The number "19" is in the bottom right corner.

XML Markup Language

- TAG or XML Element (<tag>...</tag> OR <tag />):
 - <media id="video1" descriptor="dVideoWholeScreen">
...
</media>
 - <media id="video1" descriptor="dVideoWholeScreen"/>
- Atribute (format: attribute="value")
 - id
 - descriptor
- Atribute value (between "")
 - "video1"
 - "dVideoWhole Screen"

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Designing an NCL Document

```
<?xml version="1.0" encoding="ISO-8859-1"?>
```

```
<ncl id="example01" xmlns="http://www.ncl.org.br/NCL3.0/  
EDTVProfile">
```

```
<head>
```

document header

1

```
</head>
```

```
<body>
```

document body

2

```
</body>
```

```
</ncl>
```

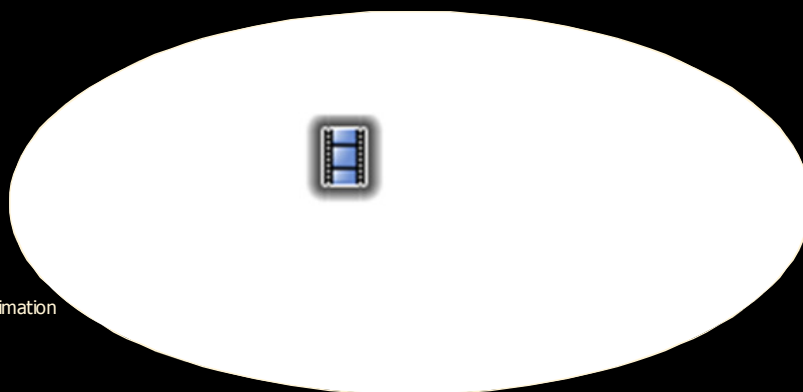


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Example 1 - Structural View



 animation



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Example 1

```
<body>
  <media id="animation" src="../../media/animGar.mp4" >
  </media>
```



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Esquema	Parte específica do esquema	Uso
file:	///file_path/#fragment_identifier	Para arquivos locais
http:	//server_identifier/file_path/#fragment_identifier	Para arquivos remotos buscados pelo canal de interatividade usando o protocolo http
https:	//server_identifier/file_path/#fragment_identifier	Para arquivos remotos buscados pelo canal de interatividade usando o protocolo https
rtsp:	//server_identifier/file_path/#fragment_identifier	Para fluxos (<i>streams</i>) obtidos pelo canal de interatividade usando o protocolo rtsp
rtp:	//server_identifier/file_path/#fragment_identifier	Para fluxos (<i>streams</i>) obtidos pelo canal de interatividade usando o protocolo rtp
ncl-mirror:	//media_element_identifier	Para um fluxo de conteúdo idêntico a um que esteja em apresentação por um outro elemento de mídia
sbtvd-ts:	//program_number.component_tag	Para fluxos elementares recebidos pelo fluxo de transporte (TS)

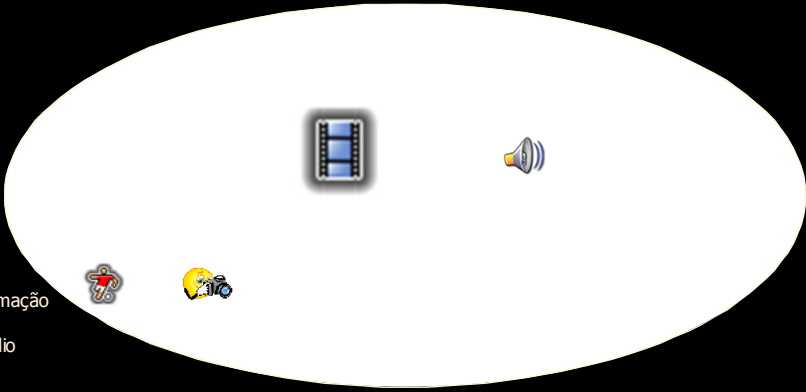


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Example 1 – Structural View



animação

áudio

drible

foto

NCL

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Example 1

```
<body>
  <media id="animation" src="../media/animGar.mp4" >
    <property name="width" value="100%"/>
    <property name="height" value="100%"/>
    <property name="zIndex" value="2"/>
  </media>
  <media id="choro" src="../media/choro.mp3"/>
  <media id="drible" src="../media/drible.mp4">
    <property name="left" value="5%"/>
    <property name="top" value="6.7%"/>
    <property name="width" value="18.5%"/>
    <property name="height" value="18.5%"/>
    <property name="zIndex" value="3"/>
  </media>
```

NCL

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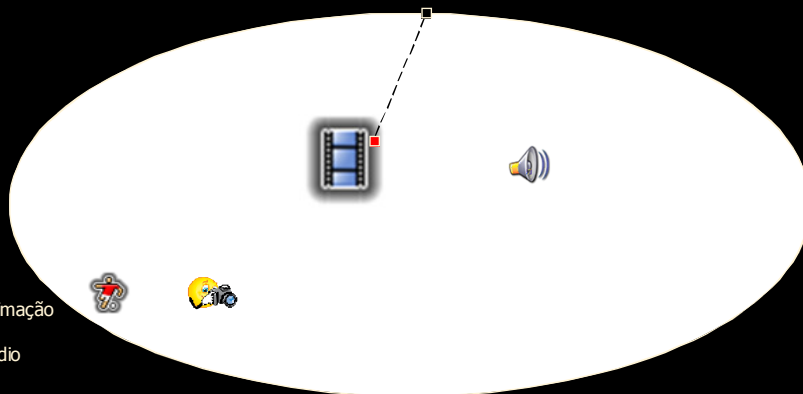
TeleMídia PUC

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Example 1

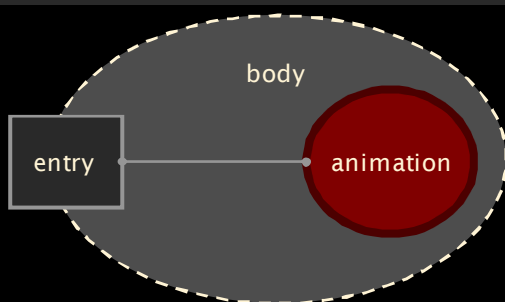
```
<media id="photo" src="../media/photo.png">  
  <property name="left" value="5%"/>  
  <property name="top" value="6.7%"/>  
  <property name="width" value="18.5%"/>  
  <property name="height" value="18.5%"/>  
  <property name="zIndex" value="3"/>  
  <property name="explicitDur" value="5s"/>  
</media>
```

Example 1 - Structural View

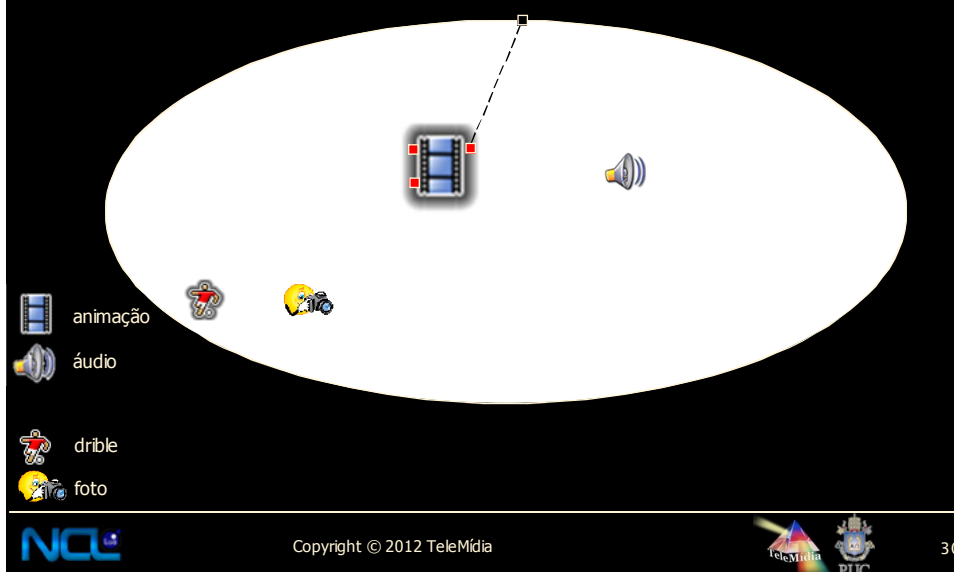


Example 1 - Context *body* and port

```
<body>  
  <port id="entry" component="animation" />  
  ...  
</body>
```



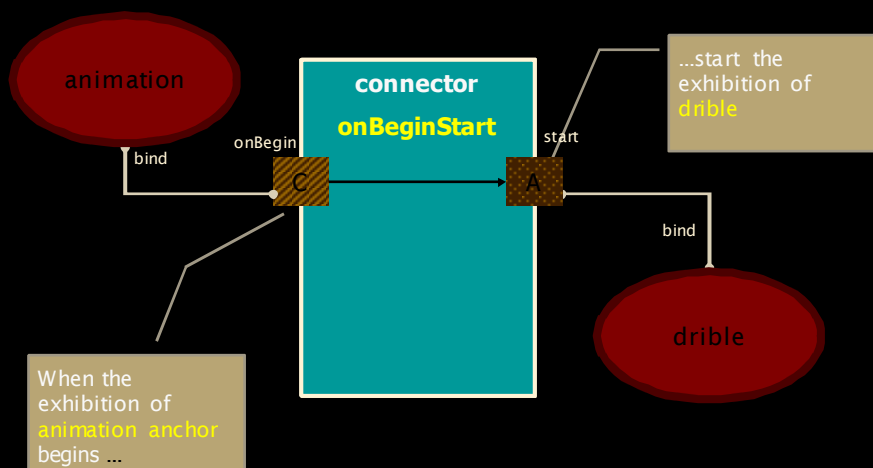
Example 1 - Structural View



Example 1

```
<body>
  <port id="entry" component="animation"/>
  <media id="animation" src="../../media/animGar.mp4" >
    <area id="segDrible" begin="12s"/>
    <area id="segPhoto" begin="41s"/>
    <property name="width" value="100%"/>
    <property name="height" value="100%"/>
    <property name="zIndex" value="2"/>
  </media>
  <media id="choro" src="../../media/choro.mp3"/>
  <media id="drible" src="../../media/drible.mp4">
    <property name="left" value="5%"/>
    <property name="top" value="6.7%"/>
    <property name="width" value="18.5%"/>
    <property name="height" value="18.5%"/>
    <property name="zIndex" value="3"/>
  </media>
</body>
```

Connector onBeginStart



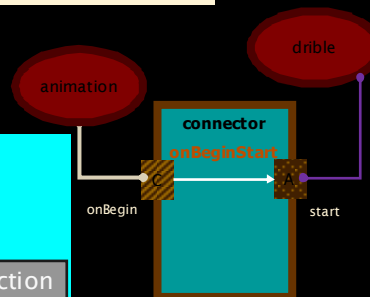
Connector *onBeginStart*

```
<causalConnector id="onBeginStart">  
  <simpleCondition role="onBegin"/>  
  <simpleAction role="start" max="unbounded" qualifier="seq"/>  
</causalConnector>
```

Link using the *onBeginStart* connector:
Starting the drible video

```
<link xconnector="onBeginStart">  
  bind role="onBegin" component="animation"  
    interface="segDrible"/>  
  <bind role="start" component="drible" />  
</link>
```

In the body section



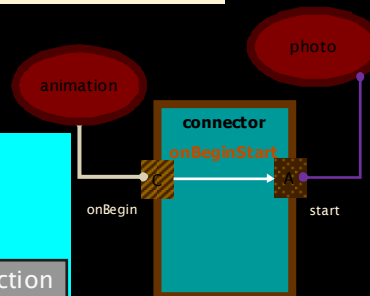
Connector *onBeginStart*

```
<causalConnector id="onBeginStart">  
  <simpleCondition role="onBegin"/>  
  <simpleAction role="start" max="unbounded" qualifier="seq" />  
</causalConnector>
```

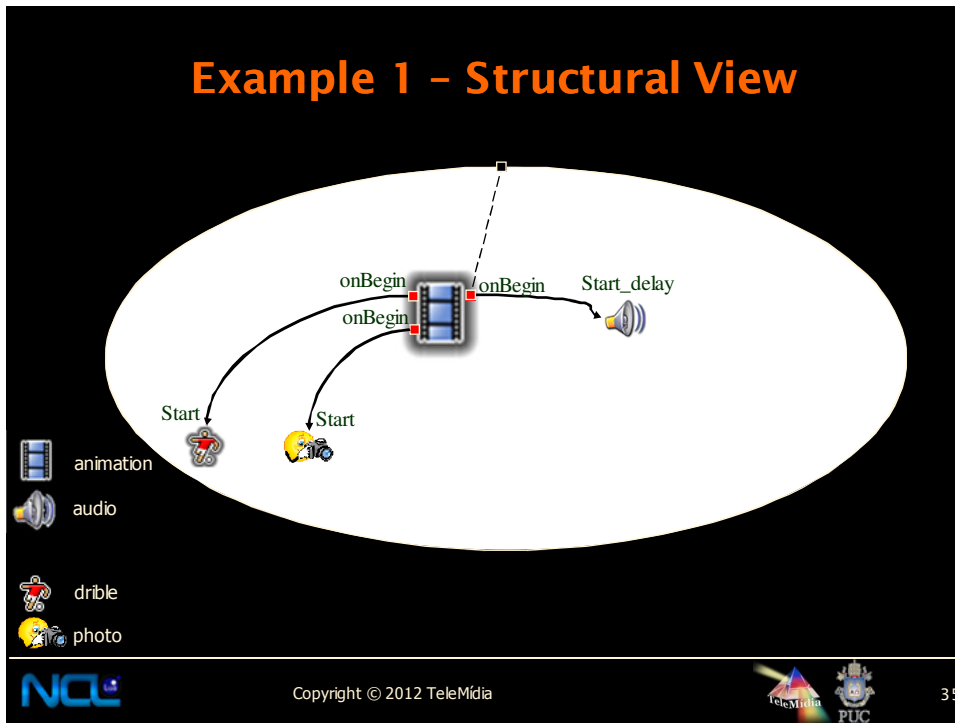
Link using the *onBeginStart* connector:
Starting the photo image

```
<link xconnector="onBeginStart">  
  bind role="onBegin" component="animation"  
    interface="segPhoto"/>  
  <bind role="start" component="photo" />  
</link>
```

In the body section



Example 1 - Structural View



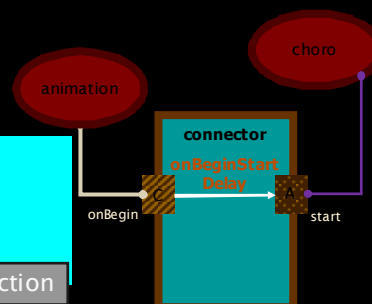
Connector *onBeginStart_delay*

```
<causalConnector id="onBeginStart_delay">
  <simpleCondition role="onBegin"/>
  <simpleAction role="start" delay="5s" max="unbounded" qualifier="seq"/>
</causalConnector>
```

Link using the *onBeginStartDelay* connector:
Starting the choro audio

```
<link xconnector="onBeginStart_delay">
  <bind role="onBegin" component="animation"/>
  <bind role="start" component="choro" />
</link>
```

In the body section



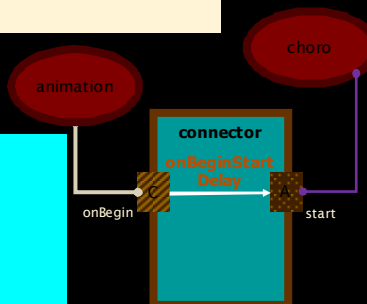
Connector *onBeginStart_delay*

```
<causalConnector id="onBeginStart_delay">
  <connectorParam name="xyz"/>
  <simpleCondition role="onBegin"/>
  <simpleAction role="start" delay="$xyz" max="unbounded" qualifier="seq"/>
</causalConnector>
```

Link using the *onBeginStartDelay* connector:
Starting the choro audio

```
<link xconnector="onBeginStart_delay">
  <bind role="onBegin" component="animation"/>
  <bind role="start" component="choro">
    <bindParam name="xyz" value="5s"/>
  </bind>
</link>
```

In the body section

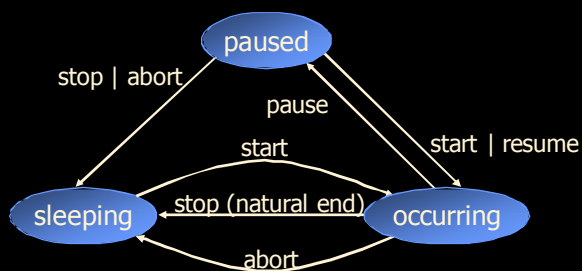


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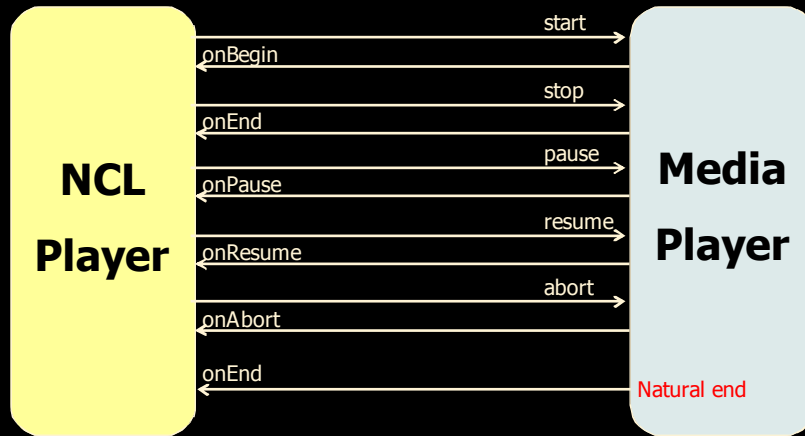
Event State Machine



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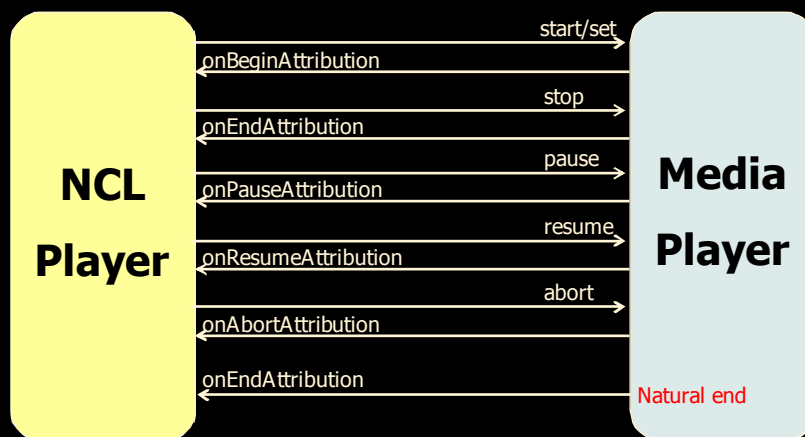
Presentation Events



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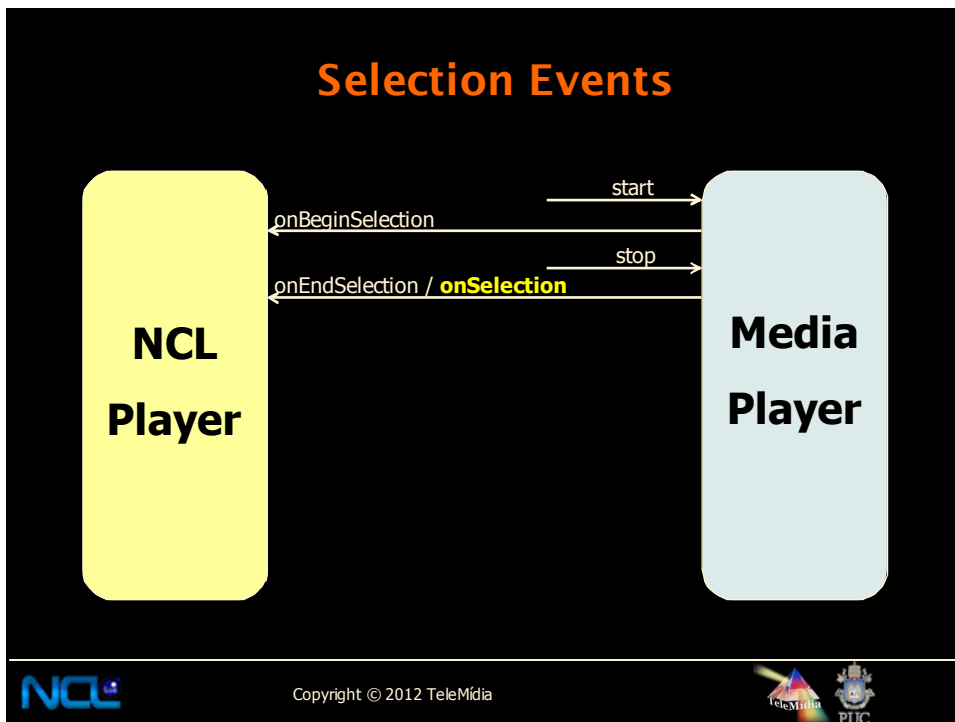
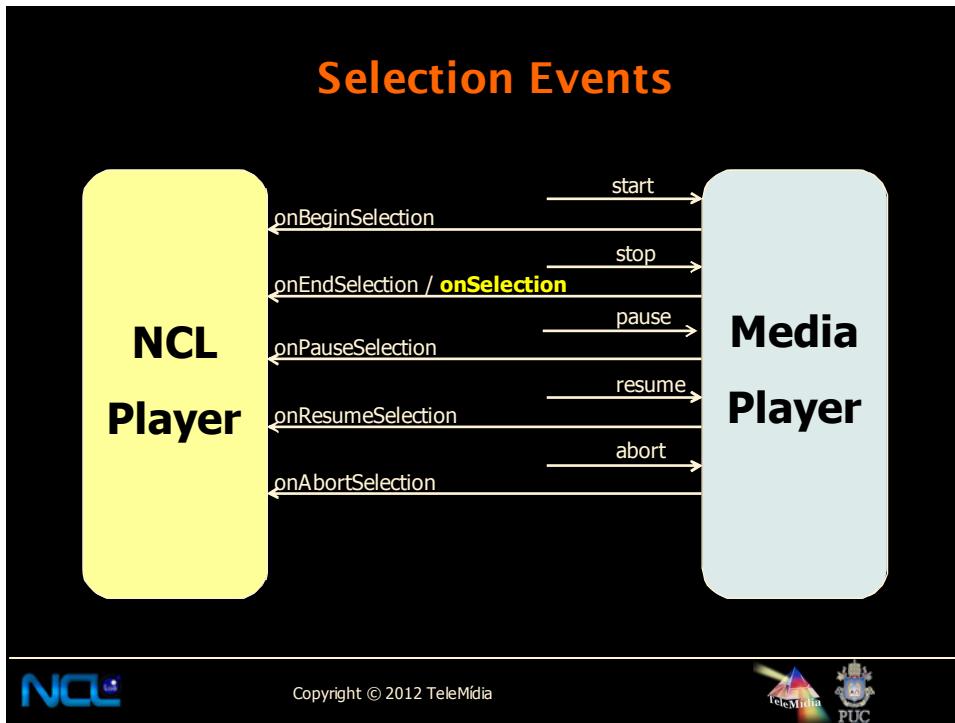


Attribution Events

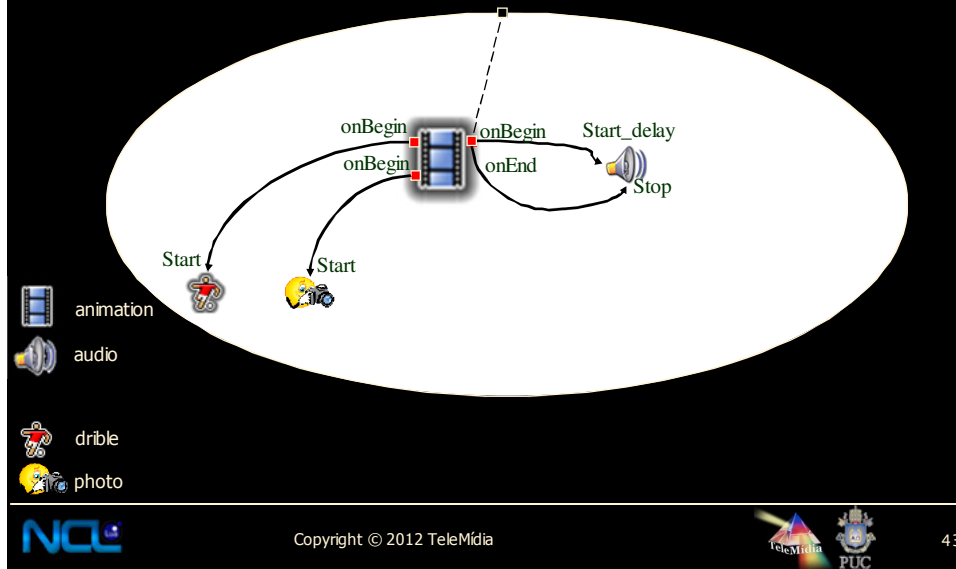


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Example 1 – Structural View



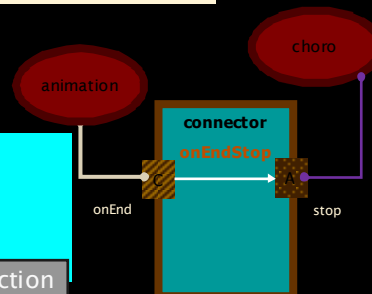
Connector *onEndStop*

```
<causalConnector id="onEndStop">
  <simpleCondition role="onEnd"/>
  <simpleAction role="stop" max="unbounded" qualifier="seq" />
</causalConnector>
```

Link using the *onEndStop* connector:
Stopping the audio

```
<link xconnector="onEndStop">
  bind role="onEnd" component="animation"/>
  <bind role="stop" component="choro" />
</link>
```

In the body section



Example 1

```
<link id="IMusic" xconnector="onBeginStart_delay">
  <bind role="onBegin" component="animation" />
  <bind role="start" component="choro">
    <bindParam name="xyz" value="5s"/>
  </bind>
</link>

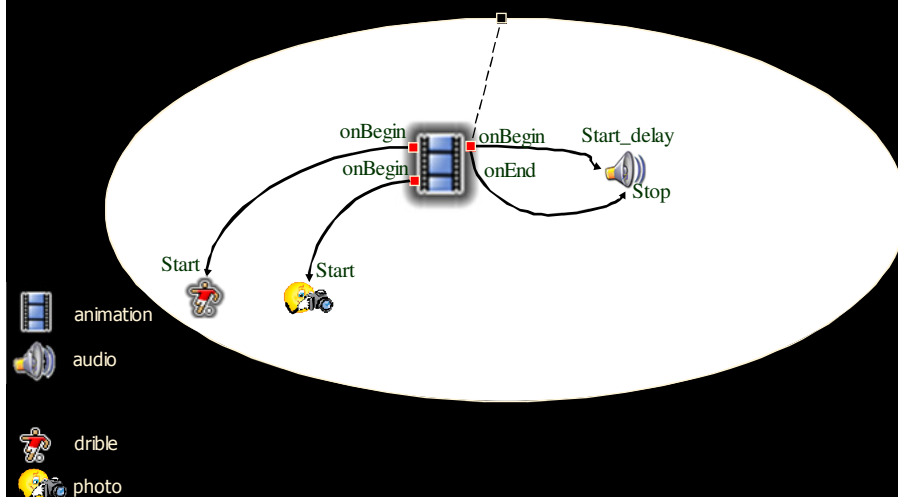
<link id="IDrible" xconnector="onBeginStart">
  <bind role="onBegin" component="animation" interface="segDrible"/>
  <bind role="start" component="drible"/>
</link>

<link id="IPhoto" xconnector="onBeginStart">
  <bind role="onBegin" component="animation" interface="segPhoto"/>
  <bind role="start" component="photo"/>
</link>

<link id="IEnd" xconnector="onEndStop">
  <bind role="onEnd" component="animation"/>
  <bind role="stop" component="choro"/>
</link>

</body>
</nc1>
```

Example 2 - Structural View



Basic Entities

what?	nodes (media objects)
how?	node's properties or descriptors
where?	node's properties or regions
when?	links and connectors



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```
<head>
```

```
<regionBase>
```

```
...
```

```
</regionBase>
```

```
<descriptorBase>
```

```
...
```

```
</descriptorBase>
```

```
<connectorBase>
```

```
...
```

```
</connectorBase>
```

```
</head>
```

```
<body>
```

```
<port id="plnicio" component="video1" />
```

```
<!-- context and media objects -->
```

```
<!-- elos -->
```

```
</body>
```

header 1

regions - *where*

descriptors - *how*

connectors - *when*

body 2

context and media - *what*

links - *when*



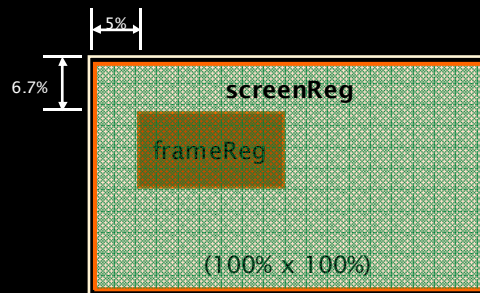
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Regions

```
<regionBase>  
  <region id="screenReg" height="100%" width="100%" zIndex="2">  
    <region id="frameReg" left="5%" top="6.7%" height="18.5%" width="160"  
                                             zIndex="3"/>  
  </region>  
</regionBase>
```



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Example 2 - Descriptors

```
<descriptorBase>  
  <descriptor id="screenDesc" region="screenReg"/>  
  <descriptor id="photoDesc" region="frameReg" explicitDur="5s"/>  
  <descriptor id="audioDesc"/>  
  <descriptor id="dribleDesc" region="frameReg"/>  
</descriptorBase>
```



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Example 2

```
<body>
{
  <port id="entry" component="animation"/>
  {
    <media id="animation" src="../media/animGar.mp4" descriptor="screenDesc">
      <area id="segDrible" begin="12s"/>
      <area id="segPhoto" begin="41s"/>
    </media>
    <media id="choro" src="../media/choro.mp3" descriptor="audioDesc"/>
    <media id="drible" src="../media/drible.mp4" descriptor="dribleDesc"/>
    <media id="photo" src="../media/photo.png" descriptor="photoDesc"/>
  }
}
```

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!-- Exemplo de sincronismo sem a interacao do usuario -->
<ncl id="sync" xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
  <head>
    <regionBase>
      <region id="screenReg" height="100%" width="100%" zIndex="1">
        <region id="frameReg" left="5%" top="6.7%" height="18.5%" width="18.5%"
          zIndex="3"/>
      </region>
    </regionBase>
    <descriptorBase>
      <descriptor id="screenDesc" region="screenReg"/>
      <descriptor id="photoDesc" region="frameReg" explicitDur="5s"/>
      <descriptor id="audioDesc"/>
      <descriptor id="dribleDesc" region="frameReg"/>
    </descriptorBase>
    <connectorBase>
      <importBase documentURI="causaIConnBase.ncl" alias="conEx"/>
    </connectorBase>
  </head>
```

Example 2

```
<link id="IMusic" xconnector="conEx#onBeginStart_delay">
  <bind role="onBegin" component="animation" />
  <bind role="start" component="choro">
    <bindParam name="xyz" value="5s"/>
  </bind>
</link>

<link id="IDrible" xconnector="conEx#onBeginStart">
  <bind role="onBegin" component="animation" interface="segDrible"/>
  <bind role="start" component="drible"/>
</link>

<link id="IPhoto" xconnector="conEx#onBeginStart">
  <bind role="onBegin" component="animation" interface="segPhoto"/>
  <bind role="start" component="photo"/>
</link>

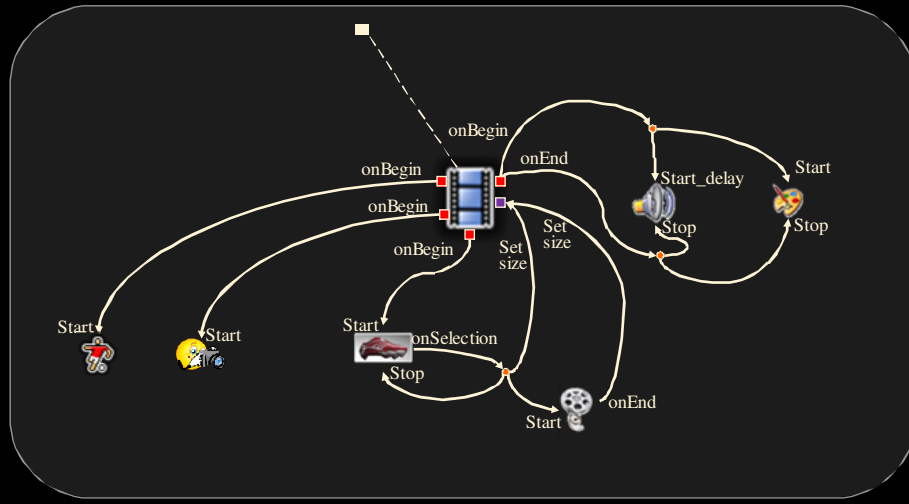
<link id="IEnd" xconnector="conEx#onEndStop">
  <bind role="onEnd" component="animation"/>
  <bind role="stop" component="choro"/>
</link>

</body>
</ncl>
```

Example 3 – Storyboard



Example 3



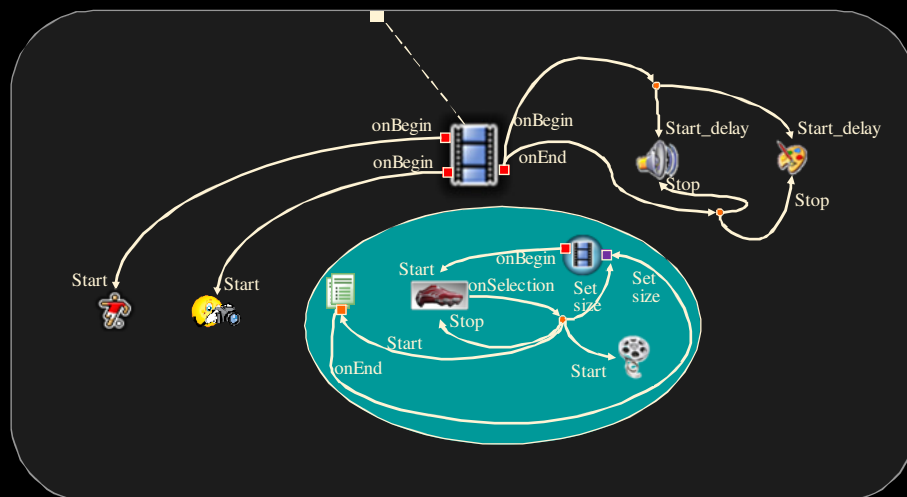
Connector onKeySelectionStopSet_varStart

```
<causalConnector id="onKeySelectionStopSet_varStart">
  <connectorParam name="var"/>
  <connectorParam name="keyCode"/>
  <simpleCondition role="onSelection" key="$keyCode"/>
  <compoundAction operator="seq">
    <simpleAction role="stop" max="unbounded" qualifier="seq"/>
    <simpleAction role="set" value="$var"/>
    <simpleAction role="start" max="unbounded" qualifier="seq"/>
  </compoundAction>
</causalConnector>
```

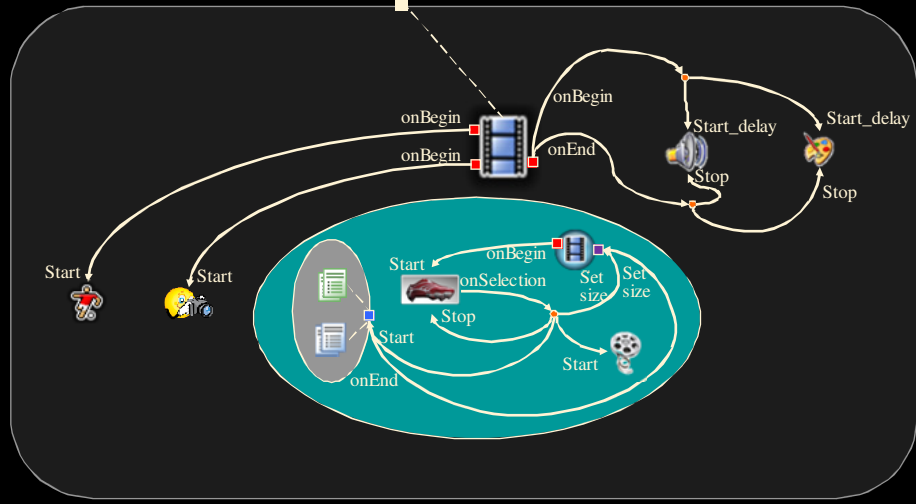

Example 6 – Storyboard

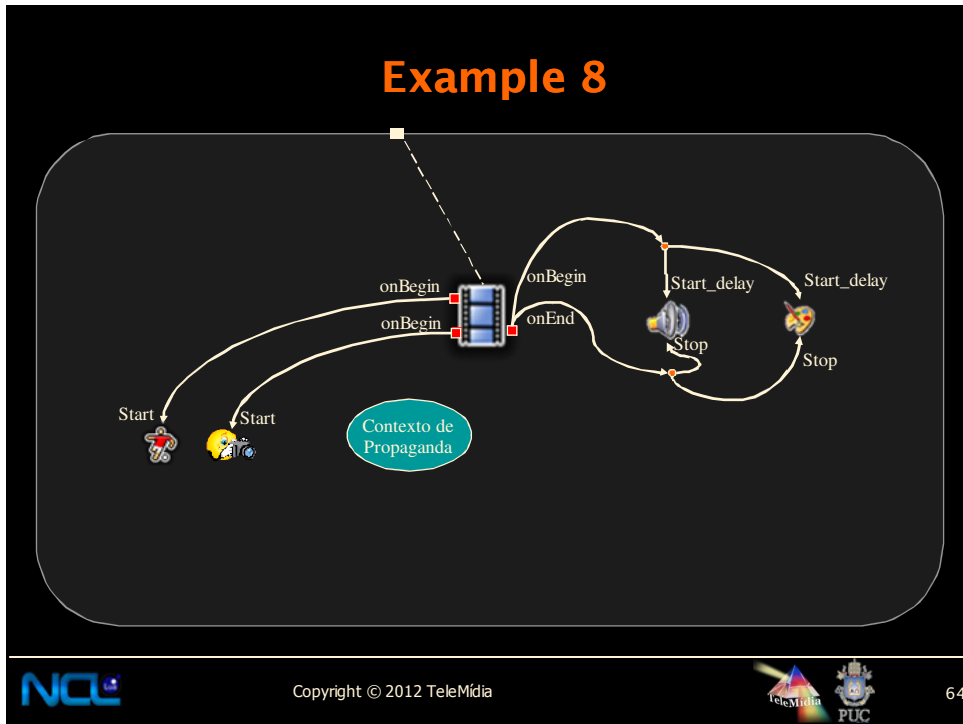


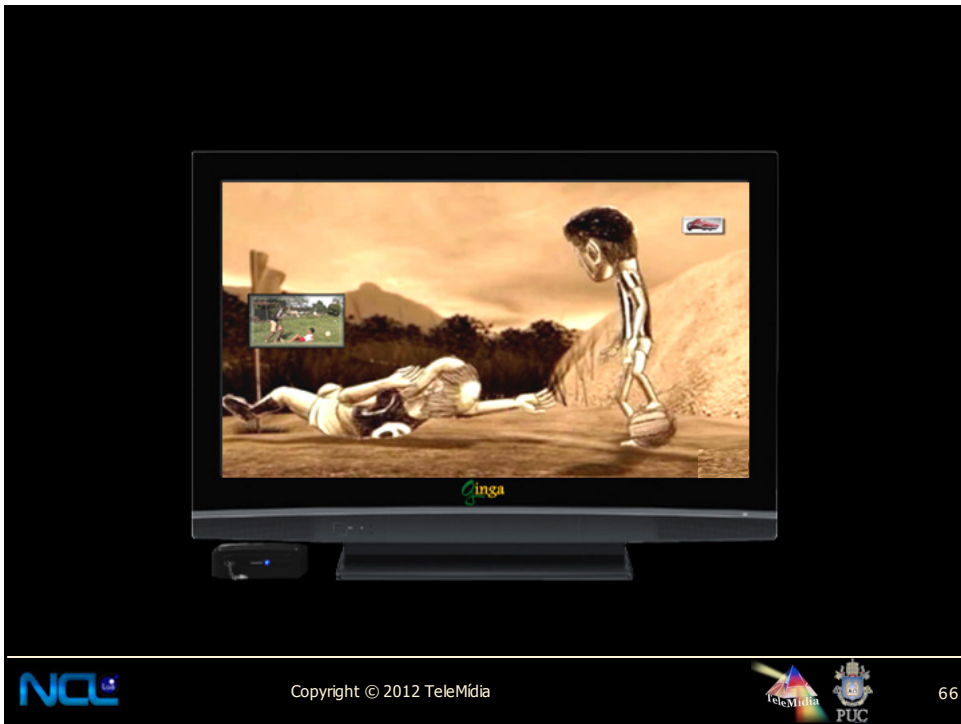
Example 6



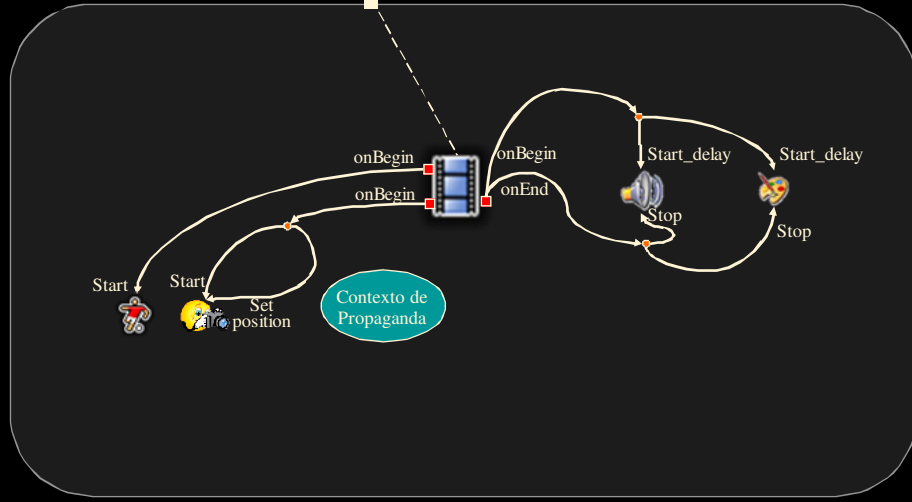
Example 7







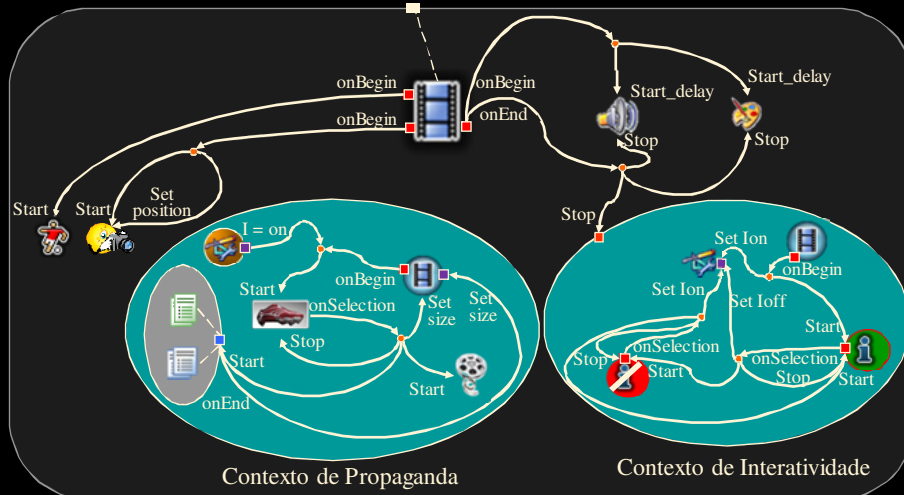
Example 9

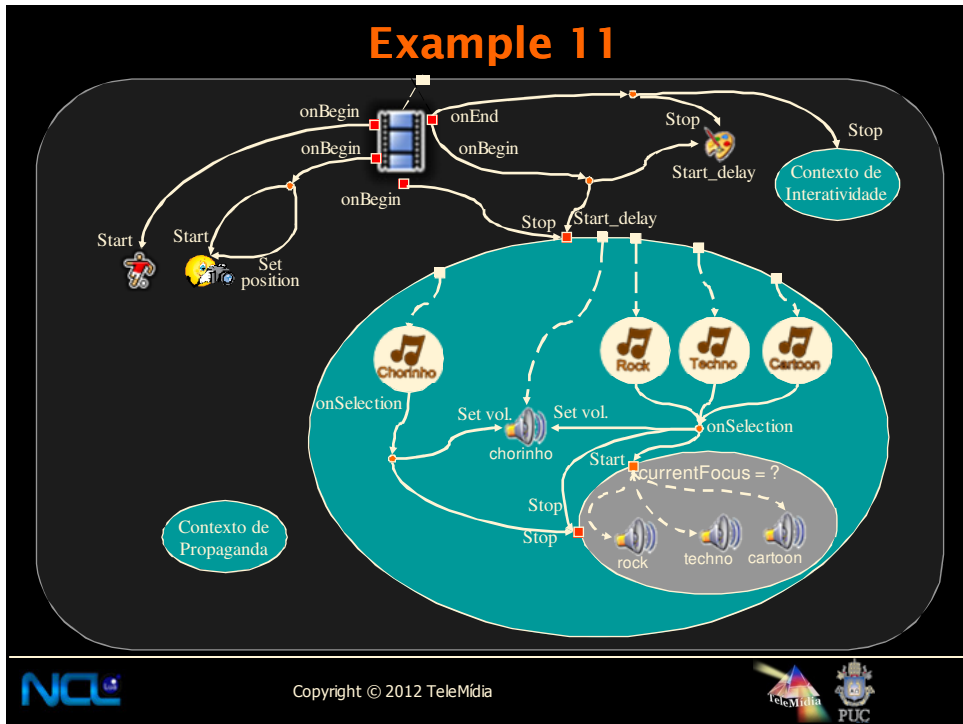
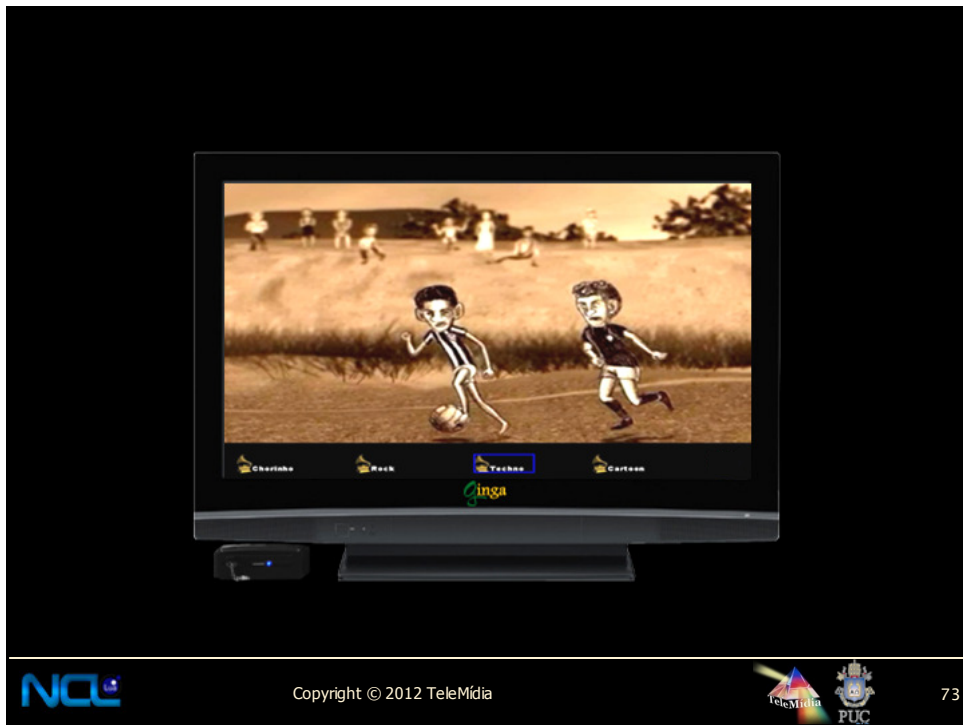


NCL Composer



Example 10





Connector *onOrSelectionSetStopStart*

```
<causalConnector id="onOrSelectionSet_varStopStart">  
  <connectorParam name="var"/>  
  <simpleCondition role="onSelection" qualifier="or" max="unbounded"/>  
  <compoundAction operator="seq">  
    <simpleAction role="set" value="$var" max="unbounded"  
      qualifier="par"/>  
    <simpleAction role="stop"/>  
    <simpleAction role="start"/>  
  </compoundAction>  
</causalConnector>
```



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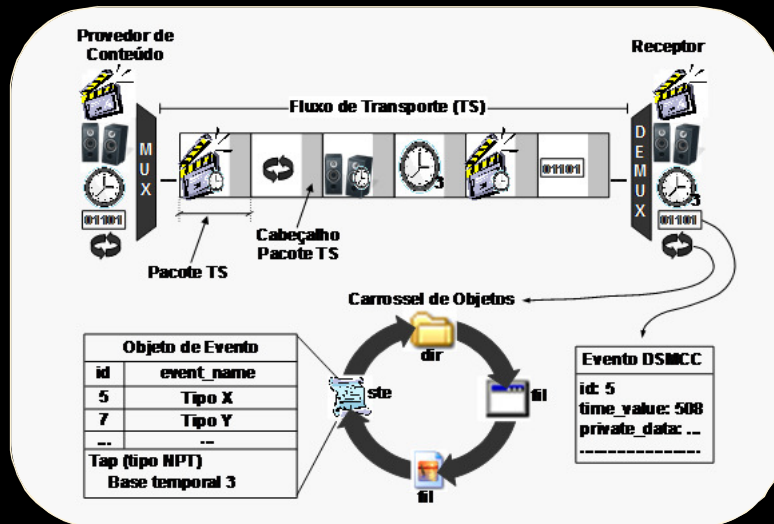
Continuous Media Streaming



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TS Stream



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Streaming

- How a content can be located?
 - programNumber?
 - componentTag?
 - What else?



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Streaming

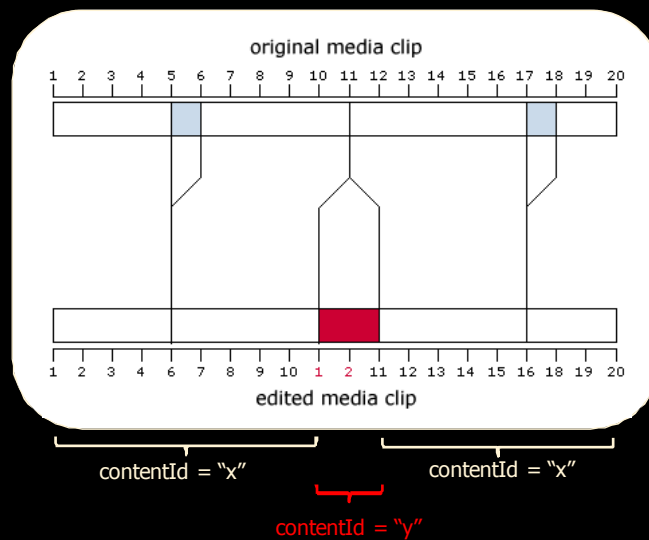
- How a content can be located?
 - programNumber
 - componentTag
 - contentId
 - How to get the contentId?



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NPT



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Synchronism

- NPT Control
- Application start point control



Starting NPT ↑



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Embedded NCLua Objects



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Interfaces

- `<area id="a1" label="internal function">`
- `<property name="internal function" value="parameter">`



Importing



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Preencha o formulário para comprar a Chuteira do João - R\$ 350,00.

Cartão de Crédito: _____
 Data de Validade: _____
 Endereço: _____

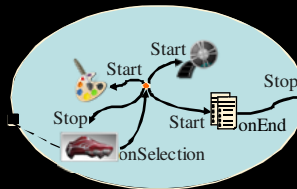
Ordem de Compra

VISA MasterCard DISCOVER Citibank

ginga

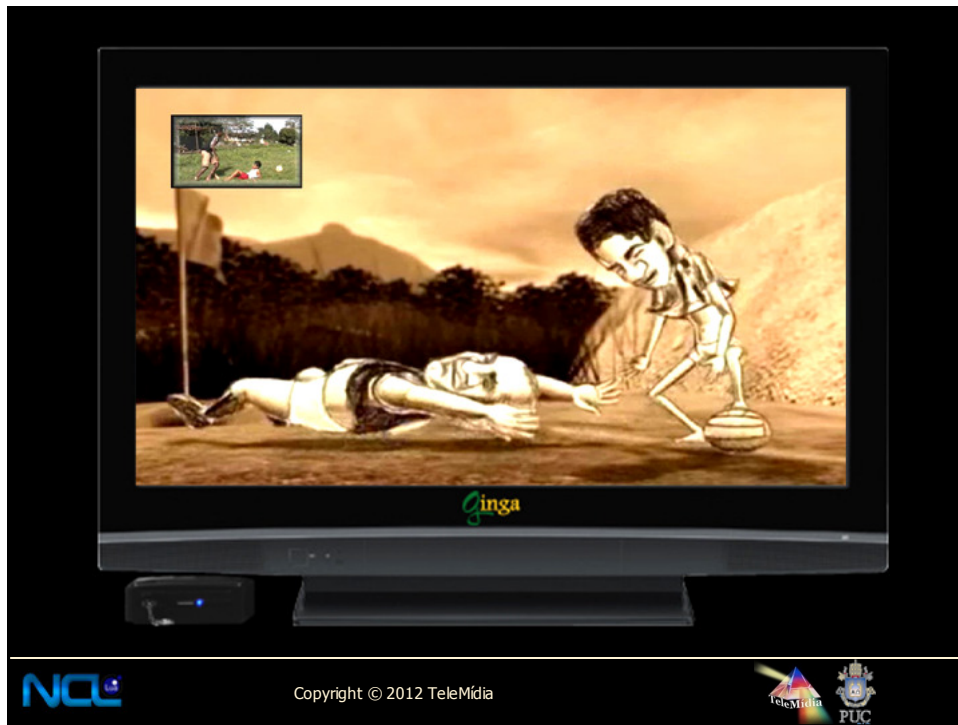
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Examples 14, 15



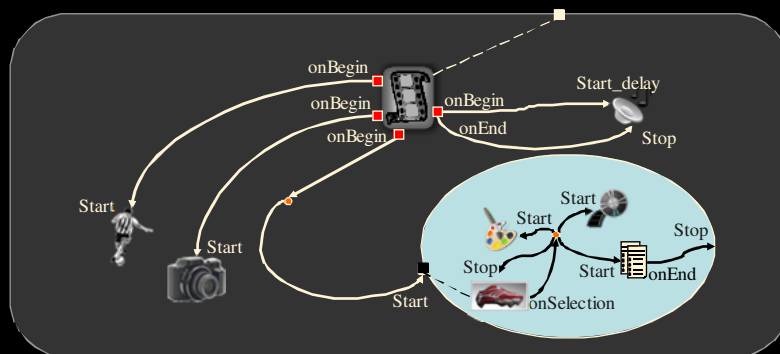
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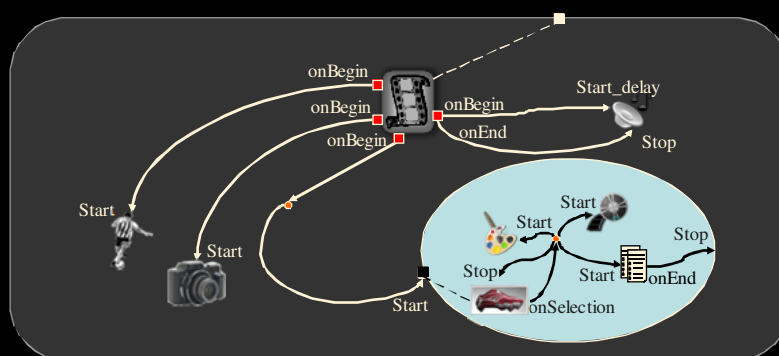


Example 13, 14



Embedded NCL Media Objects

Example 15 (embedded)



Interfaces

- `<area id="a1" label="internal body port">`
- `<property name="internal body port">`



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Multiple Exhibition Devices

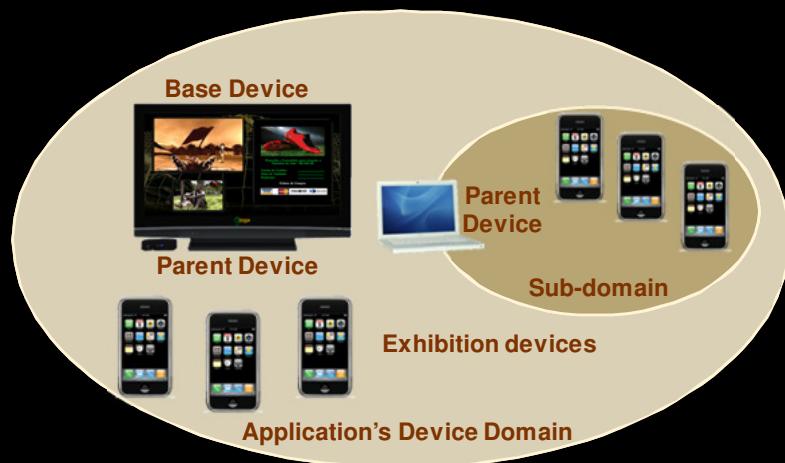


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Hierarchical Device Control Model



NCL applications refer to devices by means of classes



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NCL Device Classes

- Number of device classes is unlimited
- But any device class must fall into one of two available types: **active** or **passive**.
 - An **active device class** groups devices able to run some media players and play media delivered by a parent device.
 - A **passive device class** groups devices not required to run media players, but at least able to display raw video and/or audio streams provided by a parent device.



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NCL Device Classes

- An exhibition device can join as many classes as it wants, simultaneously.
- Joining to a class is a task to the middleware and its tools, not to the application.
- The hierarchy is a tree. In a application domain:
 - A device cannot be a descendant of itself.
 - A device in a class can only exhibit media coming from its respective parent device
 - The Base device is the root



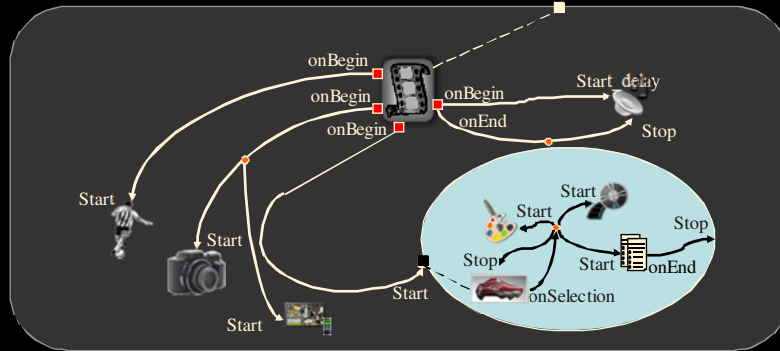
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Example 16

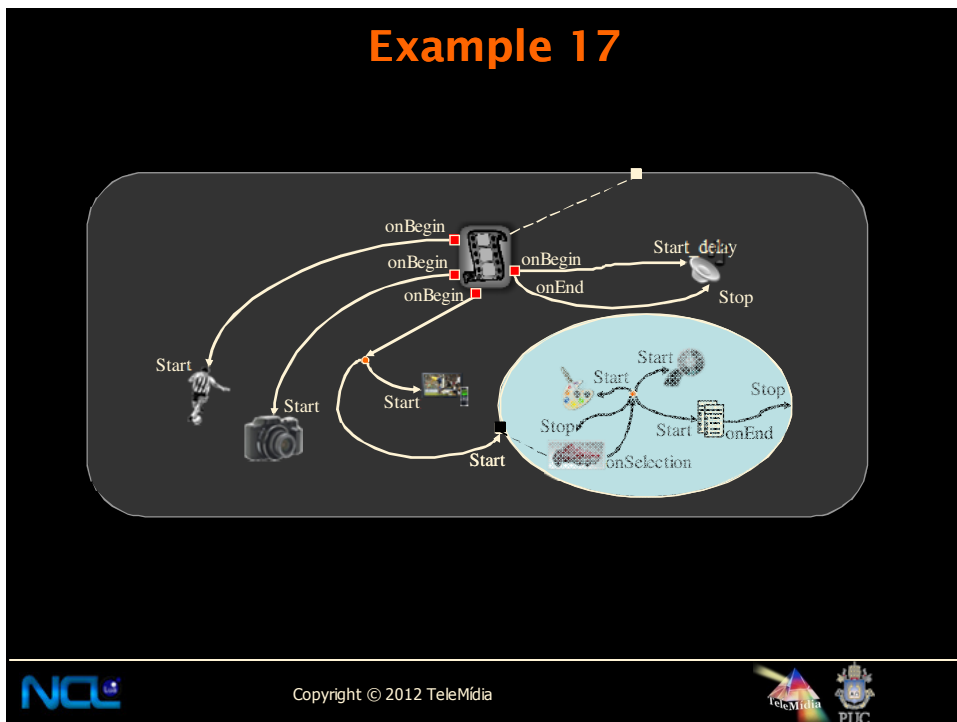


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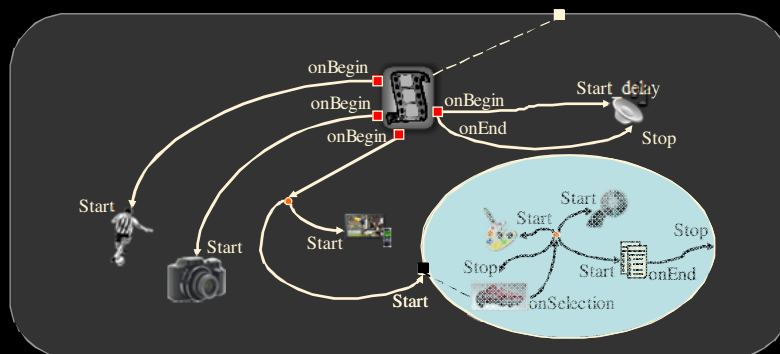
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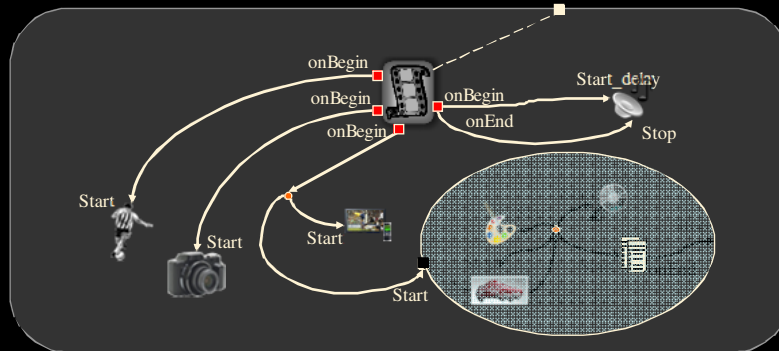




Example 18



Example 19, 20



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