Ginga-NCL: Relating Imperative, Declarative and Media Objects

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Agenda

- **Introduction**
- **Ginga-NCL**
- **Development**
- **Final Remarks**

Introduction

- **How this specific research is integrated in the broader context of iTV**
- **Aim of the research**
  - ***Propose an NCL Declarative Middleware for iTV systems***

Introduction

- **Ginga-NCL**
  - ***Declarative environment of SBTVD-T (Terrestrial Brazilian DTV System) middleware named Ginga***
  - ***NCL (Nested Context Language)***

Introduction

- **Background Work**
  - *1995*
    - NCM (Nested Context Model)
    - Hyperprop System
  - *1999*
    - NCL

Ginga-NCL

- **SBTVD-T (2005)**
  - ***Brazilian government gathered expertise on DTV (SBTVD) for future implementation in Brazil aiming at the global integration in this technology.***
- **SBTVD requirements**
  - ***The Brazilian program SBTVD envisages the social integration of the population, widely dispersed in this huge country.***
- **NCL**
  - ***Seen as a solution to this challenge.***

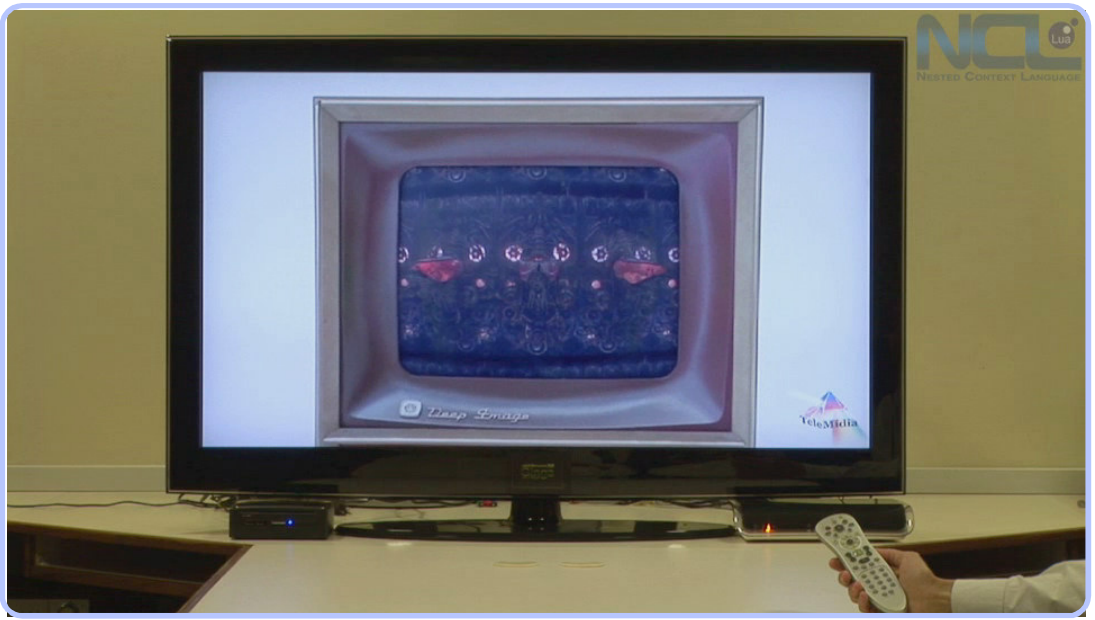
Ginga-NCL

- **XHTML**
  - ***The declarative environment of the Main terrestrial iTV Systems***
    - American (ATSC), European (DVB) and Japanese (ARIB)
- **NCL and SMIL**
  - ***Stricter separation between content and structure***
  - ***Provide a non-invasive control of presentation linking and layout***
  - ***SMIL does not define use of imperative and declarative objects, neither provides support for live editing.***

Introducing Media Objects

In NCL, a media object can define a content of any type.

```
<?xml version="1.0" encoding="UTF-8"?>
<ncl id="euroITVExample"
xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
<head>
  <regionBase device="systemScreen(0)">
   <region id="imgReg" width="20%" height="20%"
right="5%" bottom="5%"/>
   <region id="vidReg" width="100%" height="100%"
top="0%" left="0%"/>
  </regionBase>
  <descriptorBase>
   <descriptor id="imgDesc" region="imgReg"/>
   <descriptor id="vidDesc" region="vidReg"/>
  </descriptorBase>
</head>
<body>
 <port id="pVideo" component="video"/>
 <port id="pLogo" component="logo"/>
 <media id="video" src="sbtvd-ts://0x01.0x01"
descriptor="vidDesc"/>
 <media id="logo" src="media/logo.png"
descriptor="imgDesc"/>
</body>
</ncl>
```



Synchronizing media objects

In NCL, the relationships are specified by authors as spatio-temporal synchronization.

```
<?xml version="1.0" encoding="UTF-8"?>
<ncl id="euroITVExample"
xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
<head>
...
</head>
<body>
 <media id="video" src="sbtvd-ts://0x01.0x01"
descriptor="vidDesc">
    <area id="synch1" begin="17s"/>
 </media>
 <media id="battery" src="media/battery.mpg"
descriptor="batDesc"/>

 <link id="l1" xconnector="onBeginStart">
  <bind component="video" interface="synch1"
role="onBegin"/>
  <bind component="battery" role="start"/>
 </link>
...
</body>
</ncl>
```

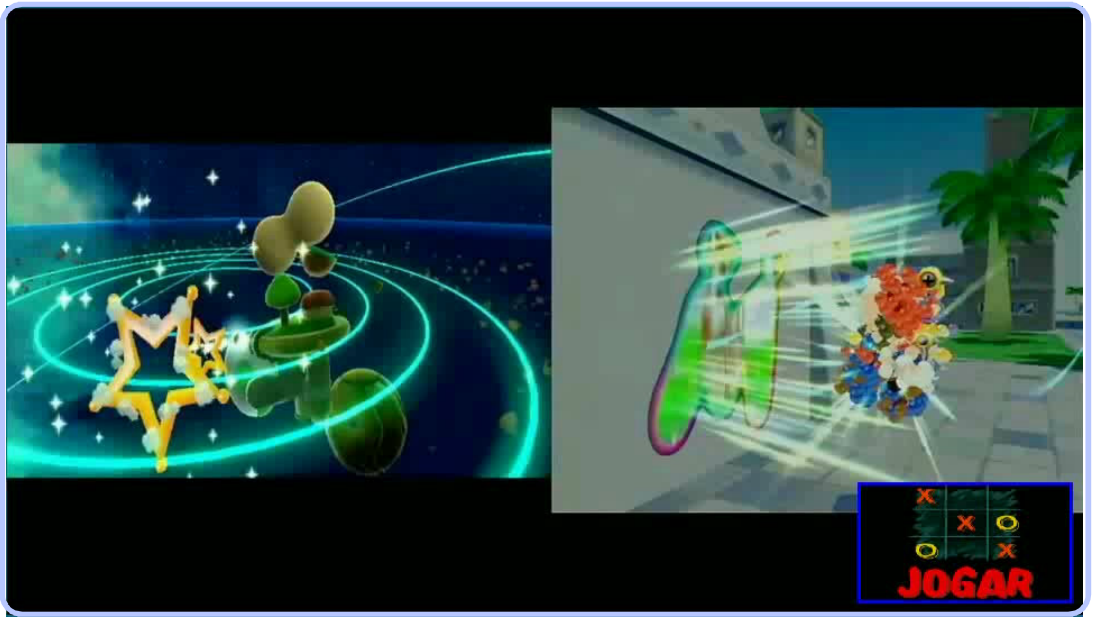
Embedding Applications (XHTML)

Unlike the existents declarative middlewares, Ginga-NCL is able to orchestrate embedded imperative and declarative applications and media objects.

```
<?xml version="1.0" encoding="UTF-8"?>
<ncl id="euroITVExample"
xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
<head>
...
 <descriptorBase>
   ...
   <descriptor id="appDesc" region="appReg"
focusIndex="0"/>
  </descriptorBase>
</head>
<body>
...
 <media id="xhtmlApp" src="app/form.xhtml"
descriptor="appDesc"/>
 <link id="lOn" xconnector="onKeySelectionStart">
  <bind role="onSelection" component="intOn">
   <bindParam name="keyCode" value="YELLOW"/>
  </bind>
  <bind role="start" component="xhtmlApp"/>
 </link>
...
</body>
</ncl>
```

Embedding NCL

```
<?xml version="1.0" encoding="UTF-8"?>
<ncl id="euroITVExample"
xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
<head>
...
 <descriptorBase>
   ...
   <descriptor id="appDesc" region="appReg"
focusIndex="0"/>
  </descriptorBase>
</head>
<body>
...
 <media id="nclApp" src="app/game.ncl"
descriptor="appDesc"/>
...
</body>
</ncl>
```



Distributing Applications

Embedding NCL applications is a facility for defining structured distributed applications across multiple exhibition devices.

```
<?xml version="1.0" encoding="UTF-8"?>
<ncl id="euroITVExample"
xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
<head>
 <regionBase device="systemScreen(0)">
...
 </regionBase>
 <regionBase device="systemScreen(1)">
   <region id="appReg" width="20%" height="20%"
           right="5%" bottom="5%"/>
 </regionBase>
 <descriptorBase>
   ...
   <descriptor id="appDesc" region="appReg"
focusIndex="0"/>
  </descriptorBase>
</head>
<body>
...
 <media id="nclApp" src="app/game.ncl"
descriptor="appDesc"/>
...
</body>
</ncl>
```

- **Multiple Exhibition Devices**
  - ***The multiple exhibition devices specification is an important point of this thesis and it has been done in association with another work in progress.***
  - ***In multiple exhibition devices specification, two classes of devices was defined: passive and active. The passive class is a class of devices that must present the same content under a unique control. The active class is a class of devices that runs the same initial content but with individual and independent control by each of its members.***

Synchronizing Distributed Applications: passive class

```
<?xml version="1.0" encoding="UTF-8"?>
<ncl id="euroITVExample"
xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
<head>
 <regionBase device="systemScreen(0)">
...
 </regionBase>
 <regionBase device="systemScreen(1)">
   <region id="appReg" width="20%" height="20%"
          right="5%" bottom="5%"/>
 </regionBase>
 <descriptorBase>
   ...
   <descriptor id="appDesc" region="appReg"
focusIndex="0"/>
  </descriptorBase>
</head>
<body>
...
 <media id="nclApp" src="app/game.ncl"
descriptor="appDesc"/>
...
</body>
</ncl>
```

Synchronizing Distributed Applications: active class

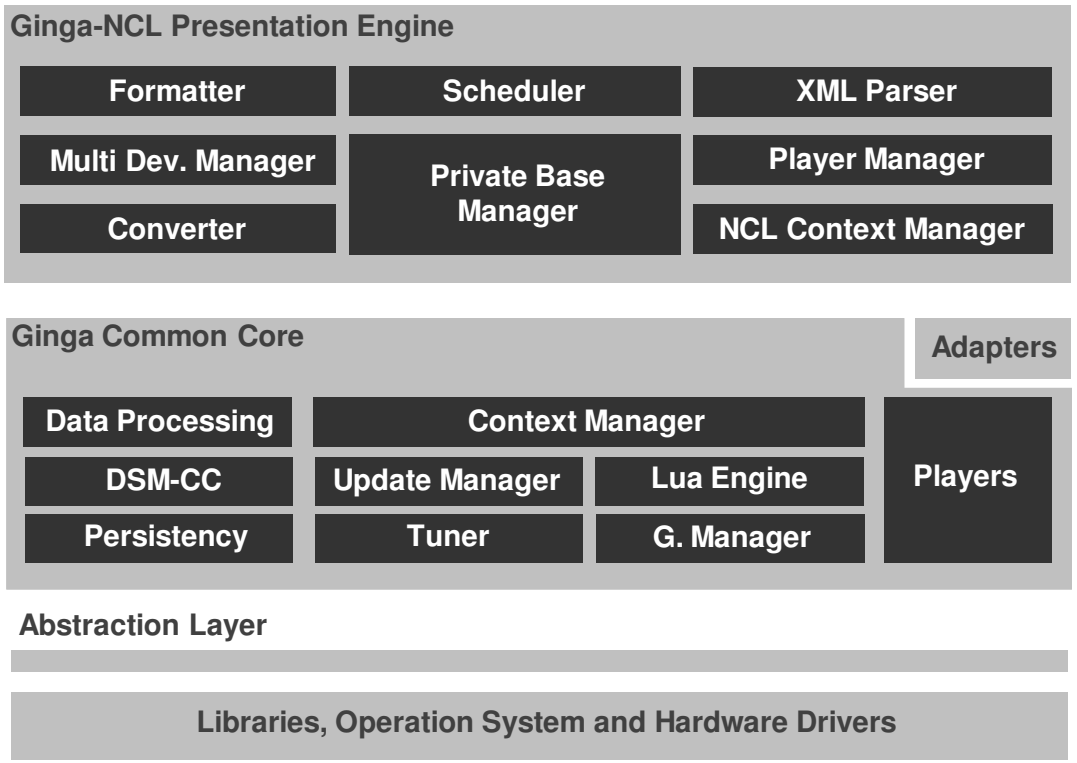
```
<?xml version="1.0" encoding="UTF-8"?>
<ncl id="euroITVExample"
xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
<head>
 <regionBase device="systemScreen(0)">
...
 </regionBase>                          1
 <regionBase device="systemScreen(X)">
   <region id="appReg" width="20%" height="20%"
           right="5%" bottom="5%"/>
 </regionBase>
 <descriptorBase>
   ...
   <descriptor id="appDesc" region="appReg"
focusIndex="0"/>
  </descriptorBase>
</head>
<body>
...
 <media id="nclApp" src="app/advert.ncl"
descriptor="appDesc"/>
...
</body>
</ncl>
```

Ginga-NCL Architecture (work done so far)

Two logical subsystems

Running NCL Applications

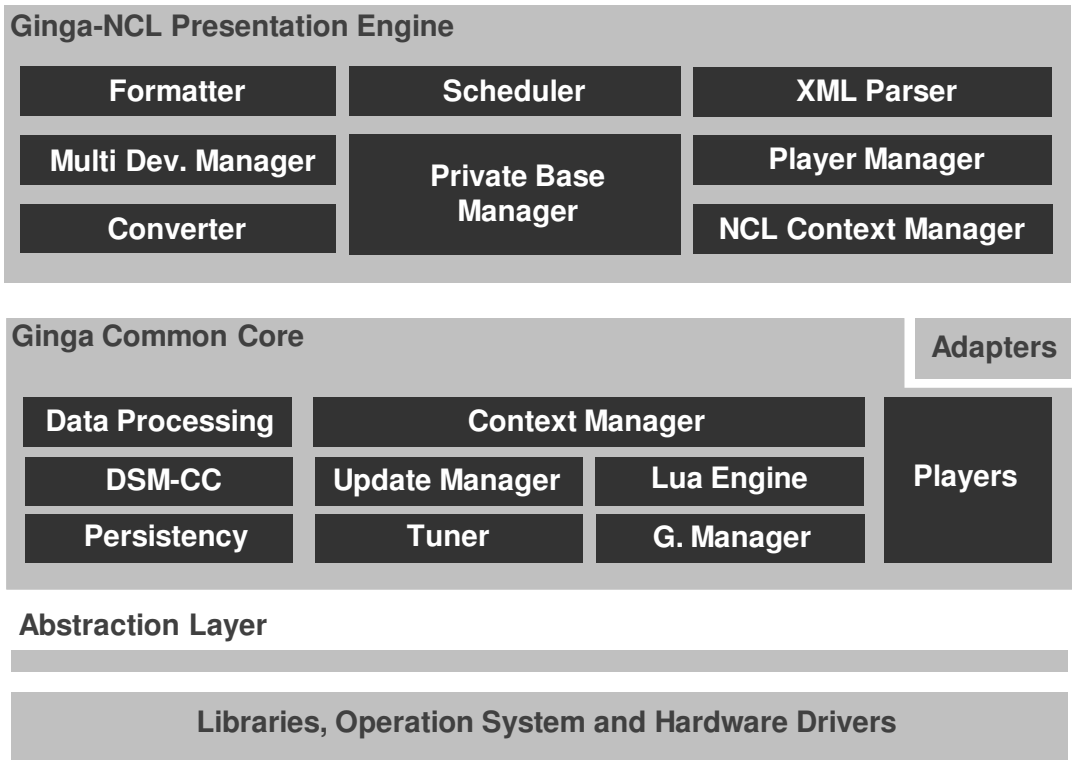
Provide Common DTV Services



Development

Ginga-NCL Architecture (work done so far)

Components: loaded only if it is necessary



Development

- **Work to be done**
  - ***Measure Approaches (componentized vs non-componentized)***
    - Performance vs. usage of memory
      - *How to measure the parameters?*
      - *How can the applicability of the componentized approach to all devices be shown?*
  - ***NCL with embedded applications***
    - Relationships and active devices support
    - Which new challenges and opportunities can be derived from the presented available results?

Final Remarks

- **Achievements**
  - ***Ginga-NCL (Standards)***
    - Brazilian Standard ABNT NBR 15606-2
      - *Data Codification and Transmission Specifications for Digital Broadcasting, Part 2 –* **Ginga-NCL***: XML Application Language for Application Coding*
    - ITU-T Consented Recommendation H.761, 2009.
      - *Nested Context Language (NCL) and* **Ginga-NCL** *for IPTV Services. Geneva, January, 2009.*

Final Remarks

- **Achievements**
  - ***Ginga-NCL (system)***
    - SBTVD-T Reference Implementation
      - *http://www.gingancl.org.br (open source)*

Final Remarks

- **Achievements**
  - ***Ginga-NCL (main publications)***
    - WEBMEDIA 2006: RODRIGUES, R. F. ; MORENO, Márcio Ferreira ; SOARES, Luiz Fernando Gomes . Controle de Apresentação de Aplicações Declarativas em Receptores de Sistemas de TV Digital Interativa.
    - DOCENG 2006: COSTA, Romualdo Monteiro Resende ; MORENO, Márcio Ferreira ; RODRIGUES, R. F. ; SOARES, Luiz Fernando Gomes . Live Editing of Hypermedia Documents.
    - JBCS 2007: SOARES, Luiz Fernando Gomes ; RODRIGUES, R. F. ; MORENO, Márcio Ferreira . Ginga-NCL: the Declarative Environment of the Brazilian Digital TV System. Journal of the Brazilian Computer Society

Final Remarks

- **Achievements**
  - ***Ginga-NCL (main publications)***
    - ISM 2007 – CMMIDMH: MORENO, Marcio Ferreira ; RODRIGUES, R. F. ; SOARES, Luiz Fernando Gomes. A Resource Identification Mechanism for Interactive DTV Systems.
    - WEBMEDIA 2008: MEDINA, Vitor Cruz ; MORENO, Márcio Ferreira ; SOARES, L. F. G. Ginga-NCL: Implementação de Referência para Dispositivos Portáteis.
    - WEBMEDIA 2008: MORENO, Márcio Ferreira ; COSTA, Romualdo Monteiro de Resende ; SOARES, L. F. G. . Sincronismo entre Fluxos de Mídia Contínua e Aplicações Multimídia em Redes por Difusão.

Final Remarks

- **Achievements**
  - ***Ginga-NCL (main publications)***
    - IJAMC 2009: MORENO, Márcio Ferreira ; SOARES NETO, Carlos de Salles ; SOARES, L. F. G. Adaptable Software Components in an Electronic Program/Service Guide Application Architecture for Context Aware Guide Presentation. In: International Journal of Advanced Media and Communications. Vol. 3 No. 4. 2009 (**to appear**).

Final Remarks

- **Expected Contribution**
  - ***Multicast Protocol for multi-device presentation support***
  - ***XML Language for device resources description***
  - ***XML Language for Components Architecture***
  - ***Provide the Reference Implementation for ITU-T***

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