



Agenda

- Digital TV overview
- Some Demos: Middleware requirements
- DTV Reference Model
- Ginga: NCL (Lua)
- Final Remarks

Digital TV

An Overview

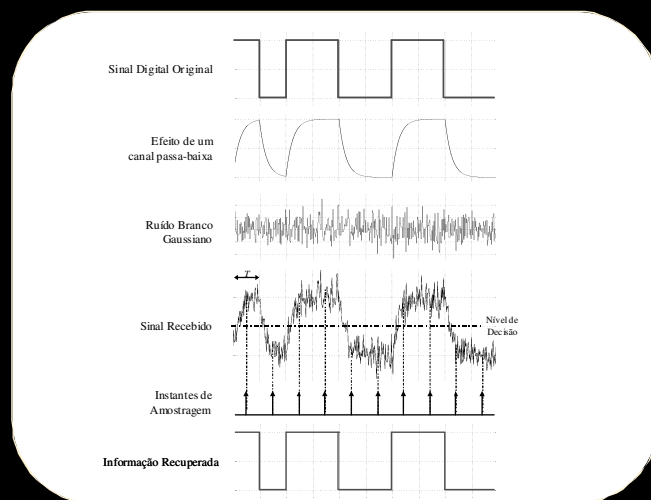


NCL

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Noise Effects



4

NCL

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Interference



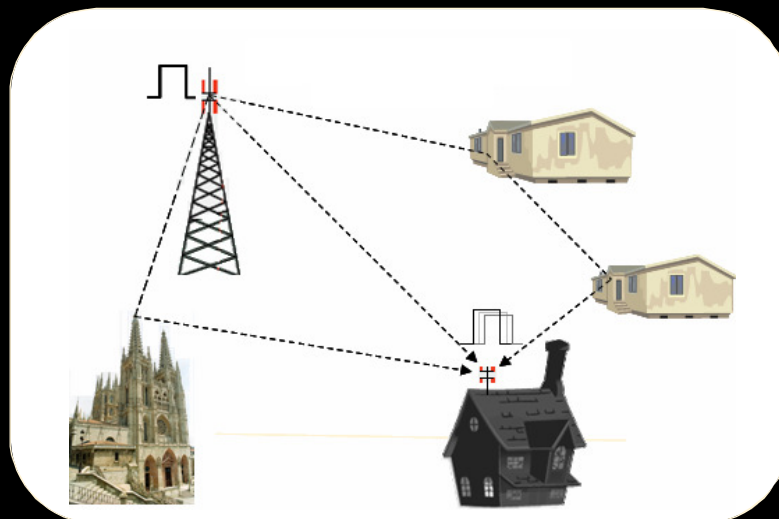
5



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Multiple Path



6



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Qualidade da Imagem - ITU-R BT. 500-11

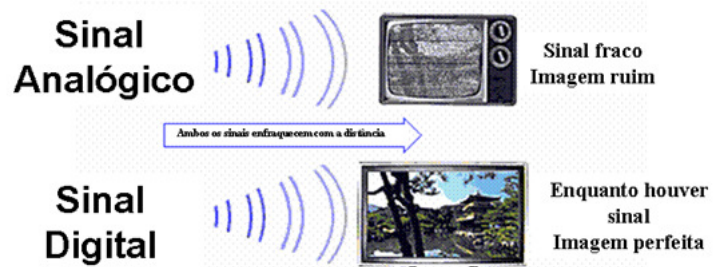


Universidade Presbiteriana Mackenzie

SBTVD

DMMB-T

Digital TV



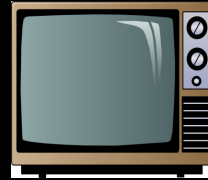
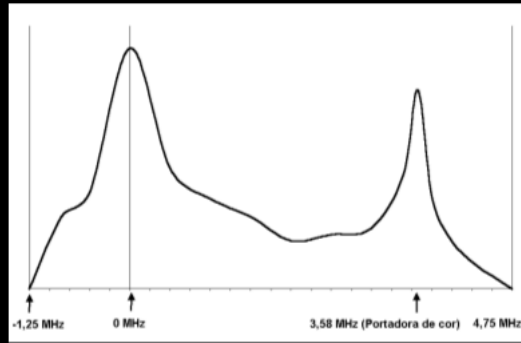
8

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Bandwidth: 6MHz



19,3 Mbps

9

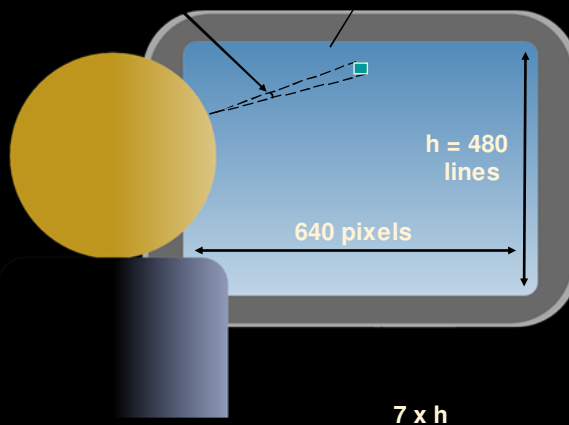


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1' minute

Picture Element
(pixel)



10



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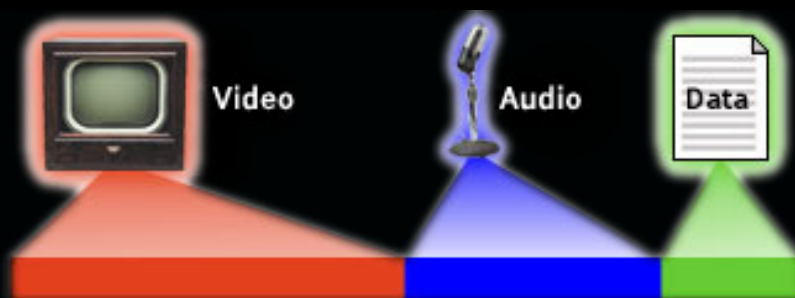


Some possibilities in 6 MHz



19,3 Mbps

Digital TV



Some alternatives in 6 MHz



19,3 Mbps

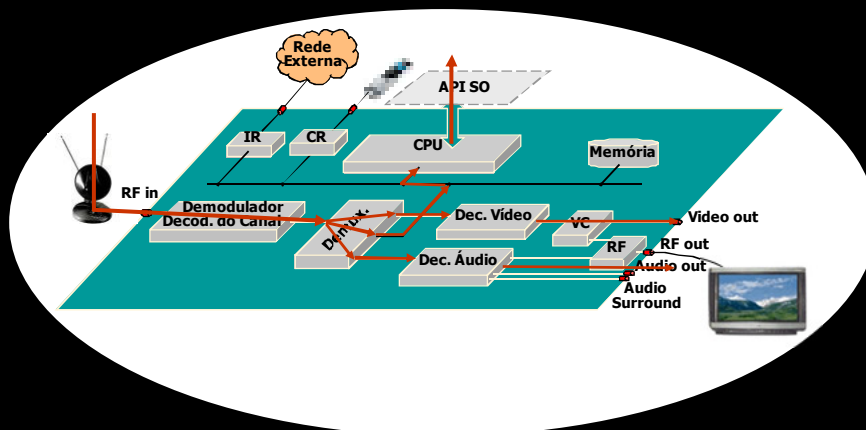
13



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Receiver



14



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Type of Applications









Application Types

- Additional content **without any semantic relationship** with the TV program (main video)
- Additional content **related with the TV program**, but **without any synchronization** with the main video
- Additional content **related with the TV program and synchronized** with the main video
- Interactive narratives

23



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Additional Support

- Interactive channel
- Multiprogramming
- Multiple exhibition devices

24



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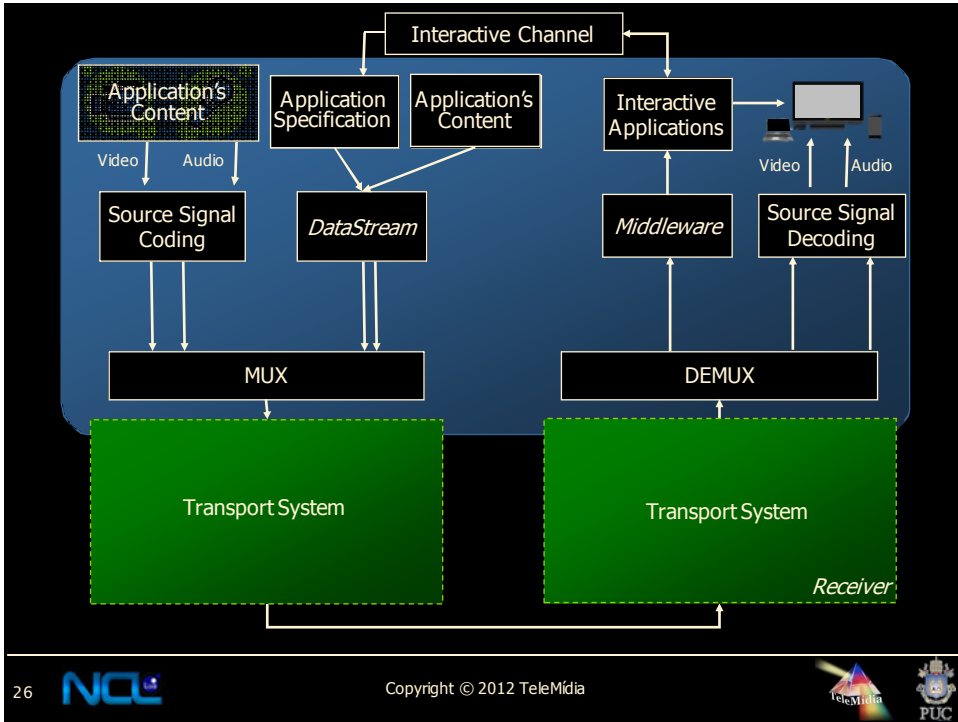


DTV Reference Model



NCL

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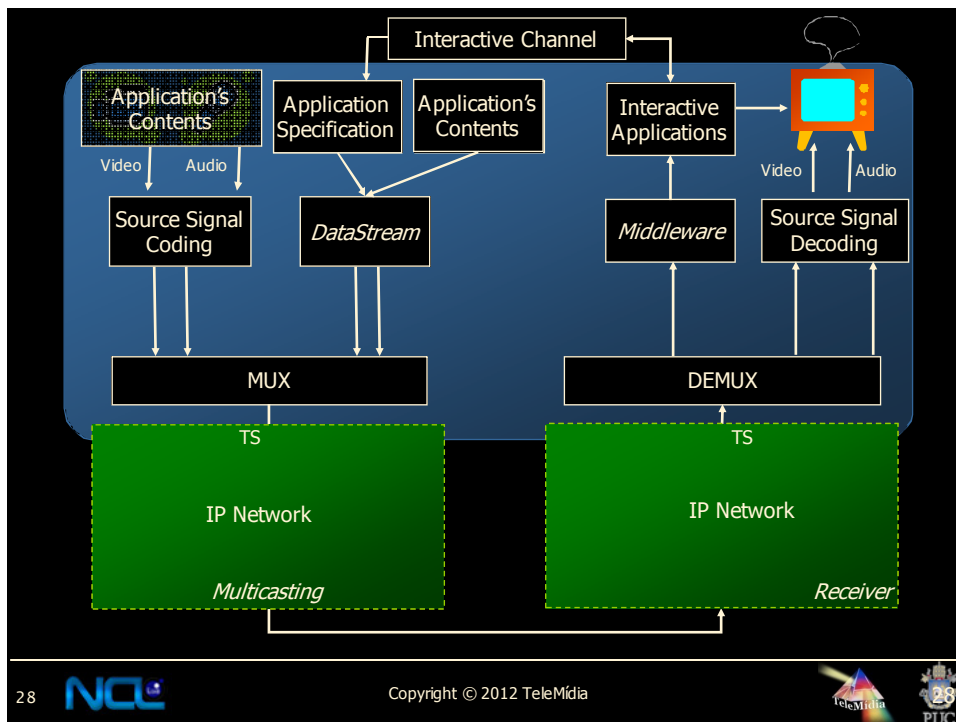
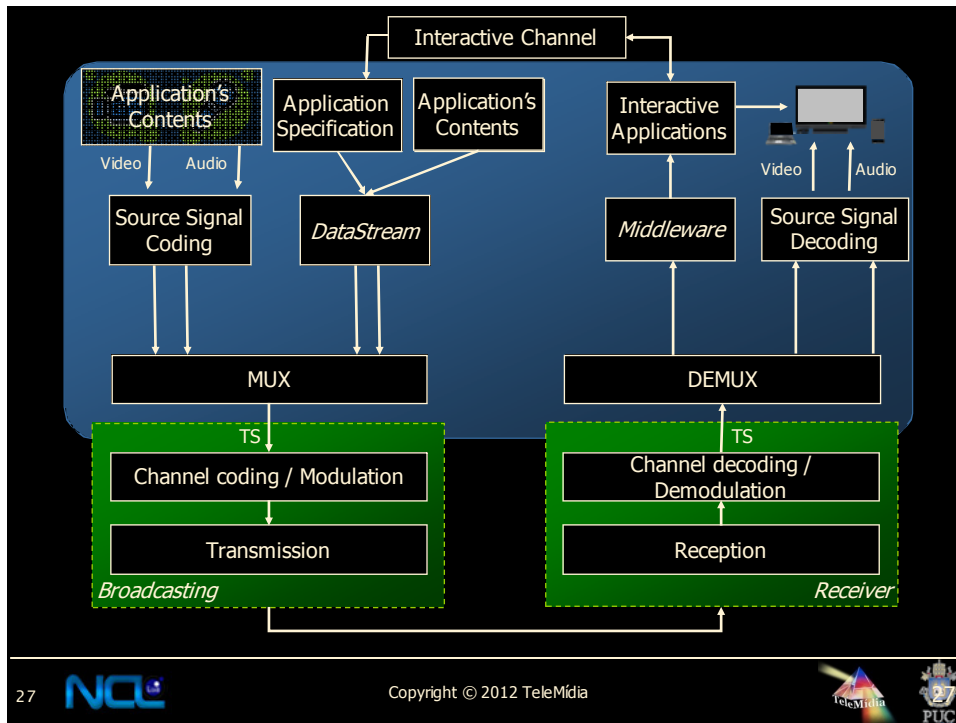


26

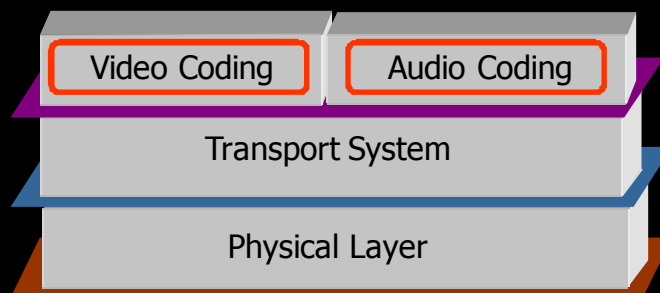
NCL

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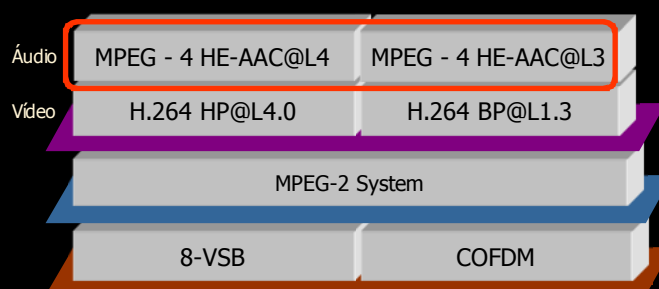




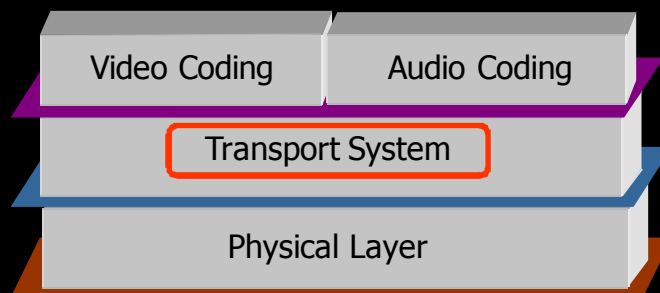
Reference Model



Reference Model



Reference Model

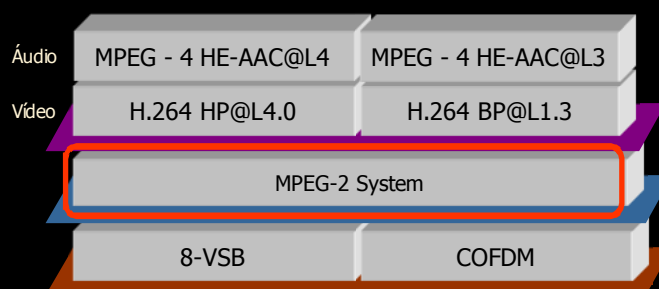


31 NCL

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Reference Model

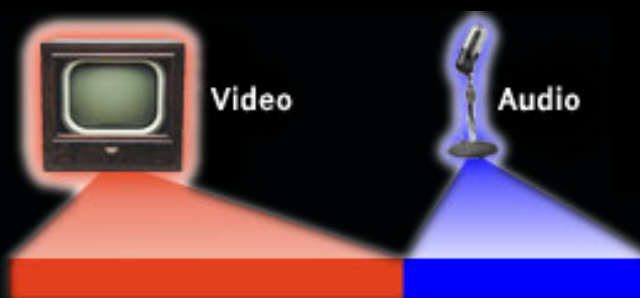


32 NCL

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Digital TV

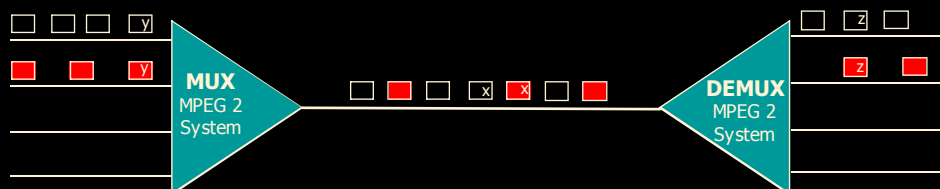


33 NCL

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Multiplexing with Time Stamps

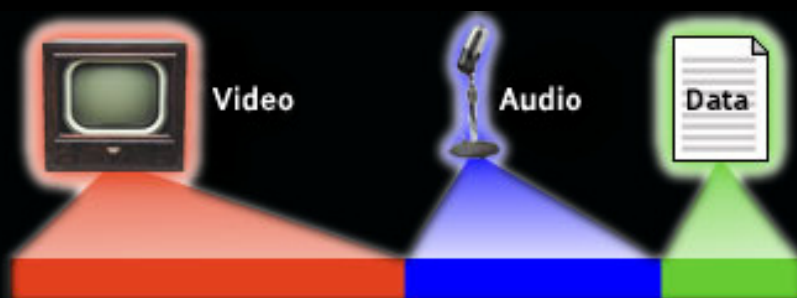


34 NCL

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Digital TV

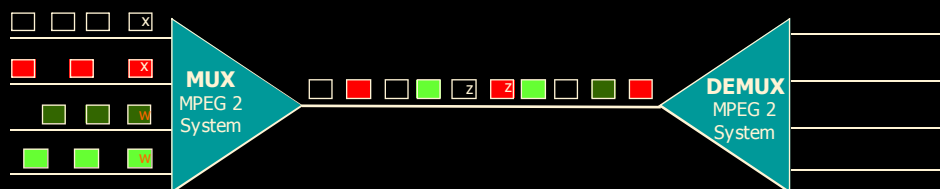


35 NCL

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Multiplexing with Time Stamps

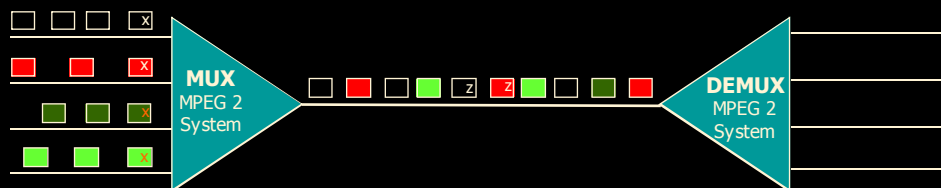


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Multiplexing with Time Stamps

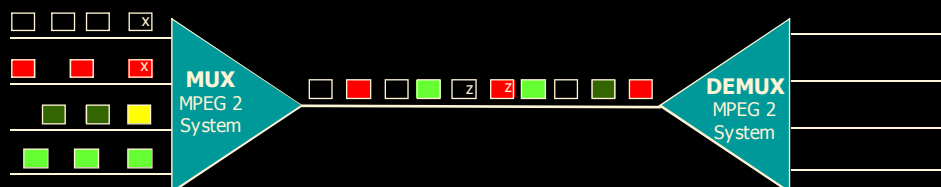


37 NCL

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Asynchronous Transport

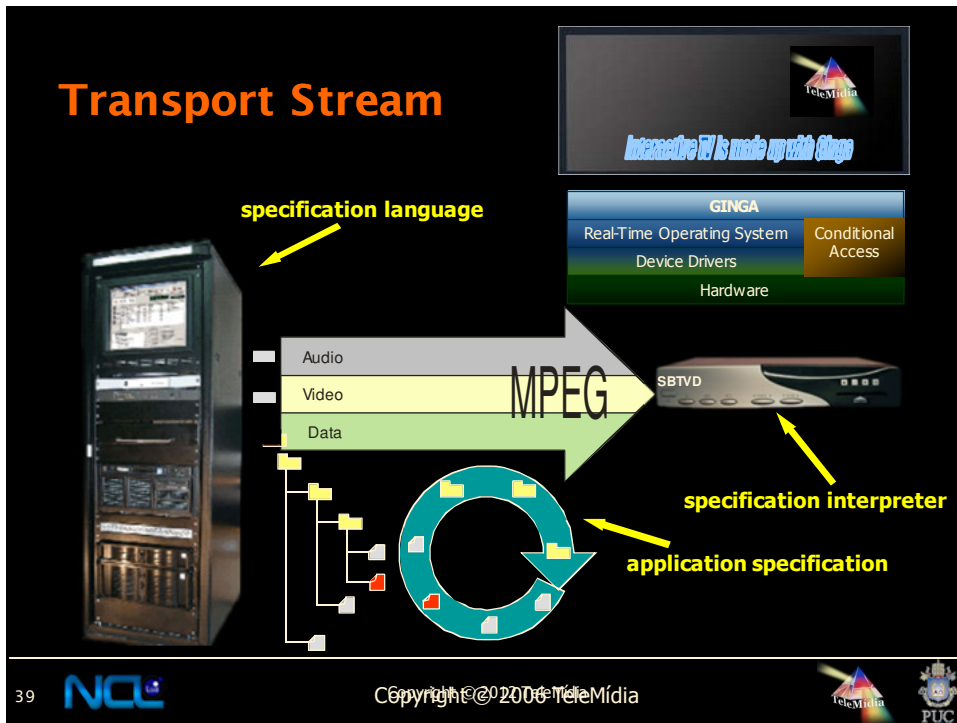


38 NCL

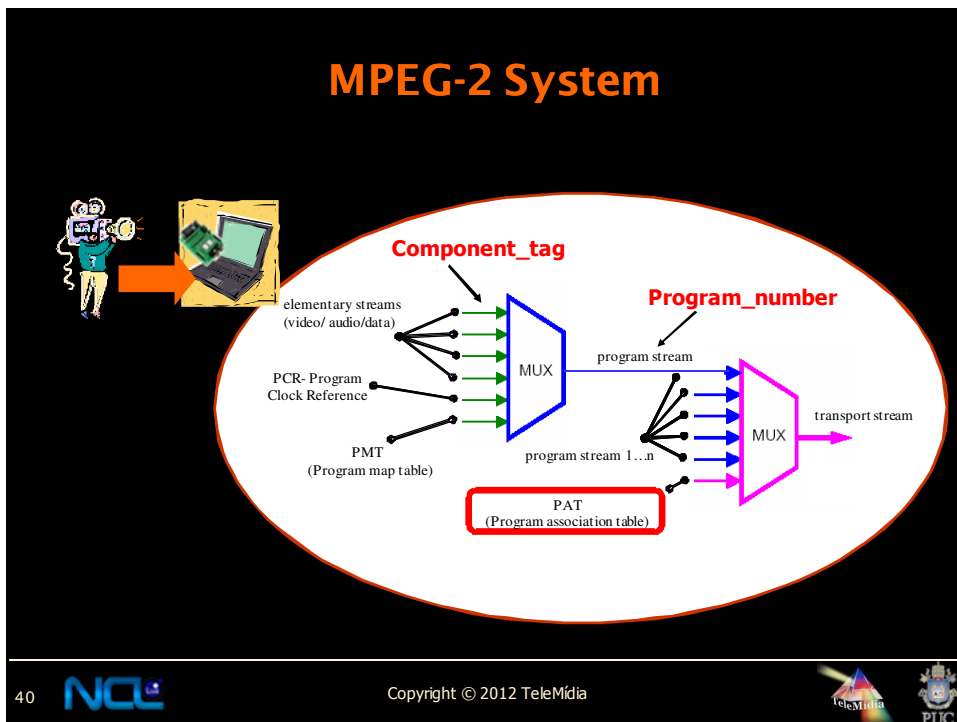
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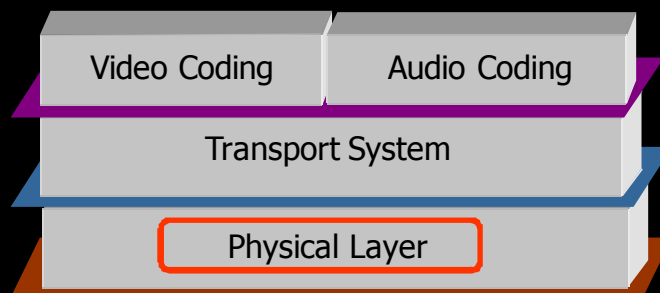
Transport Stream



MPEG-2 System



Reference Model



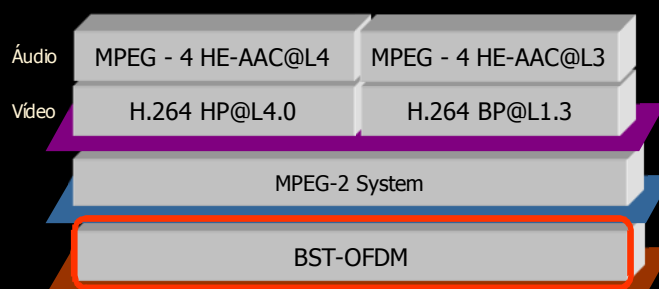
41



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Reference Model

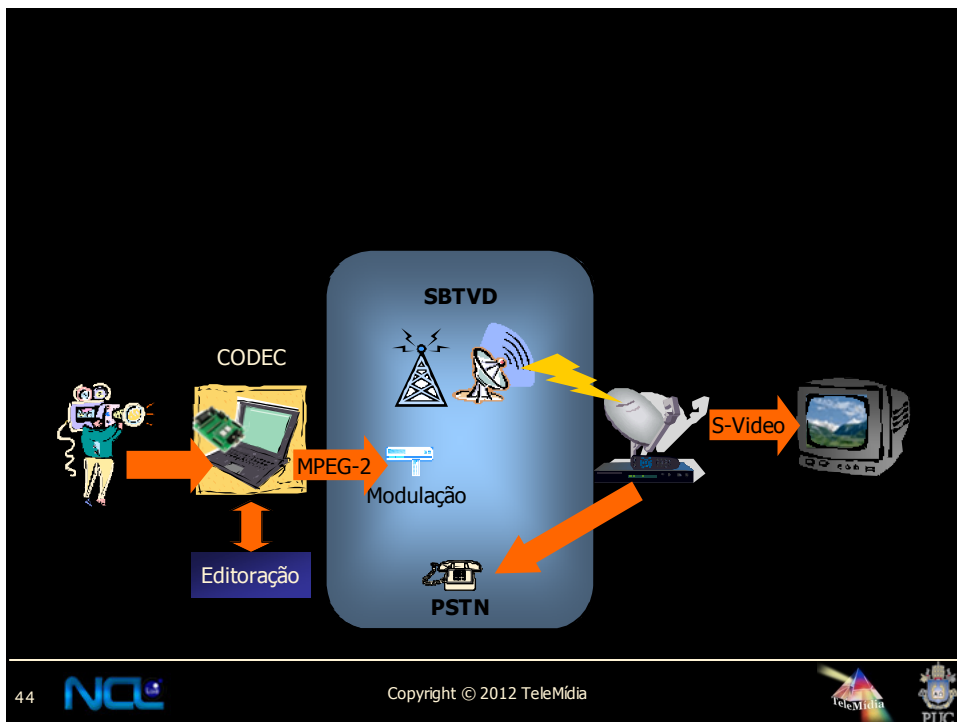
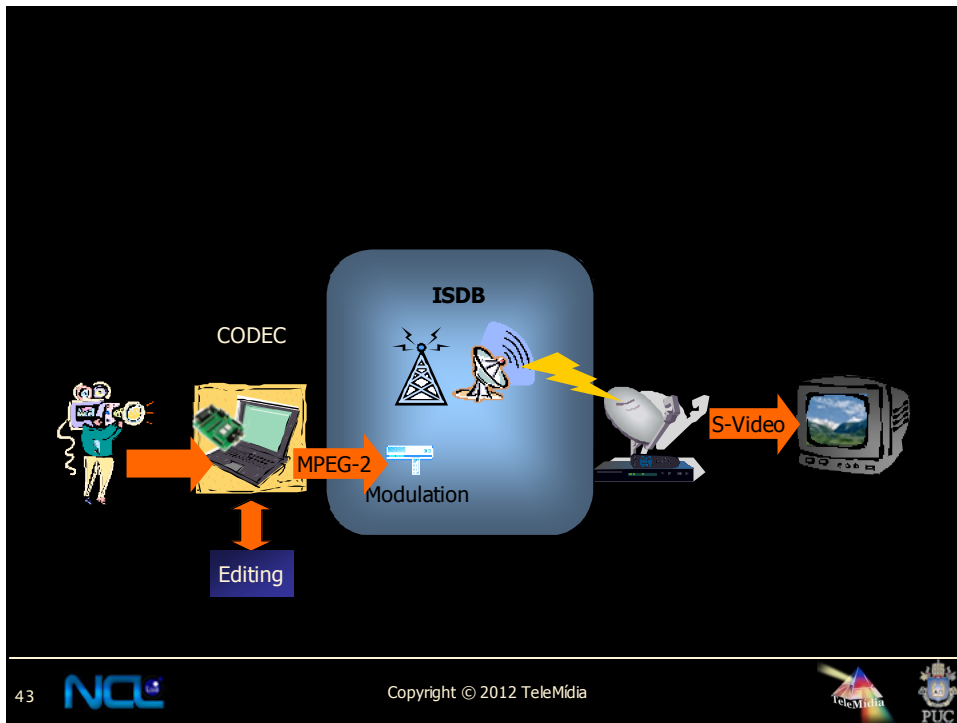


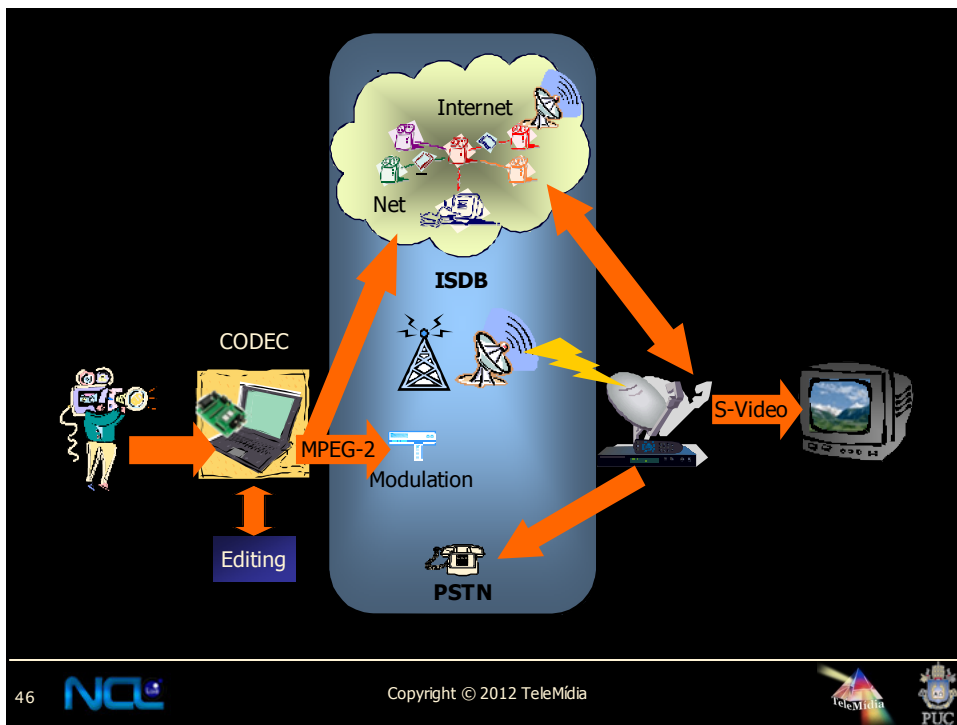
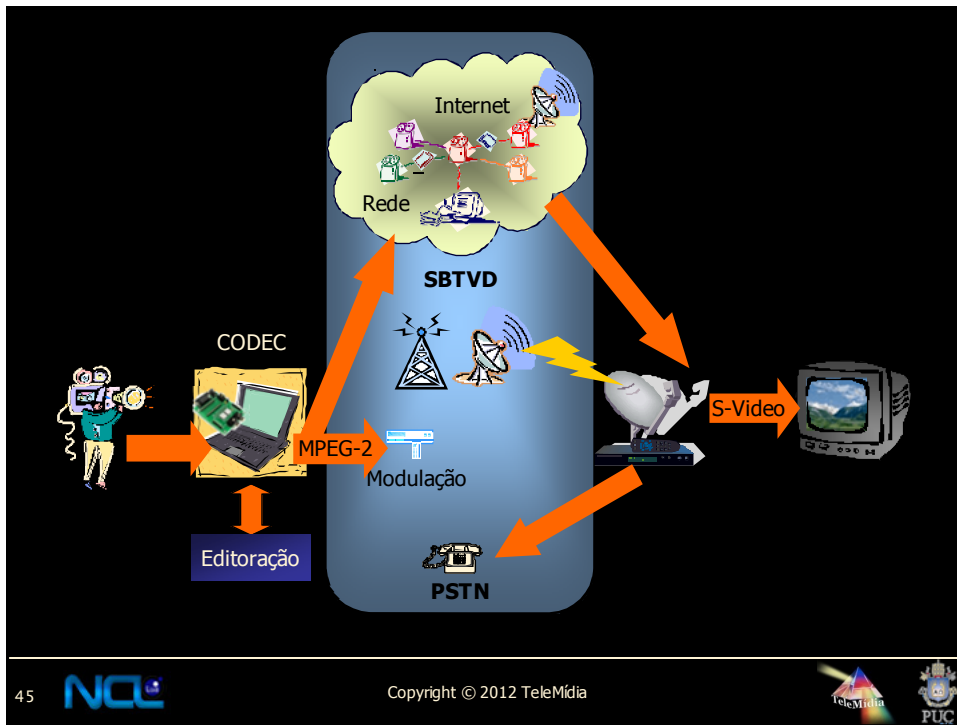
42



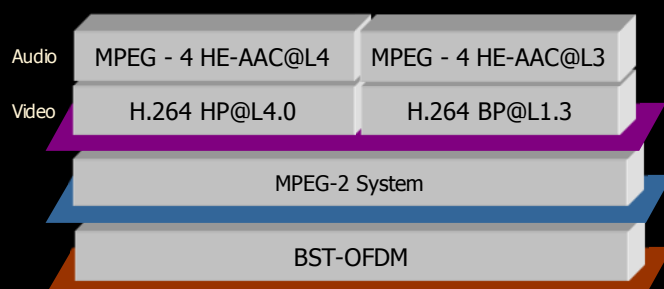
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Reference Model



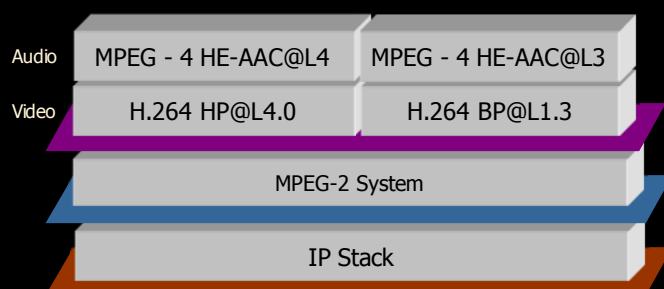
47



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Reference Model

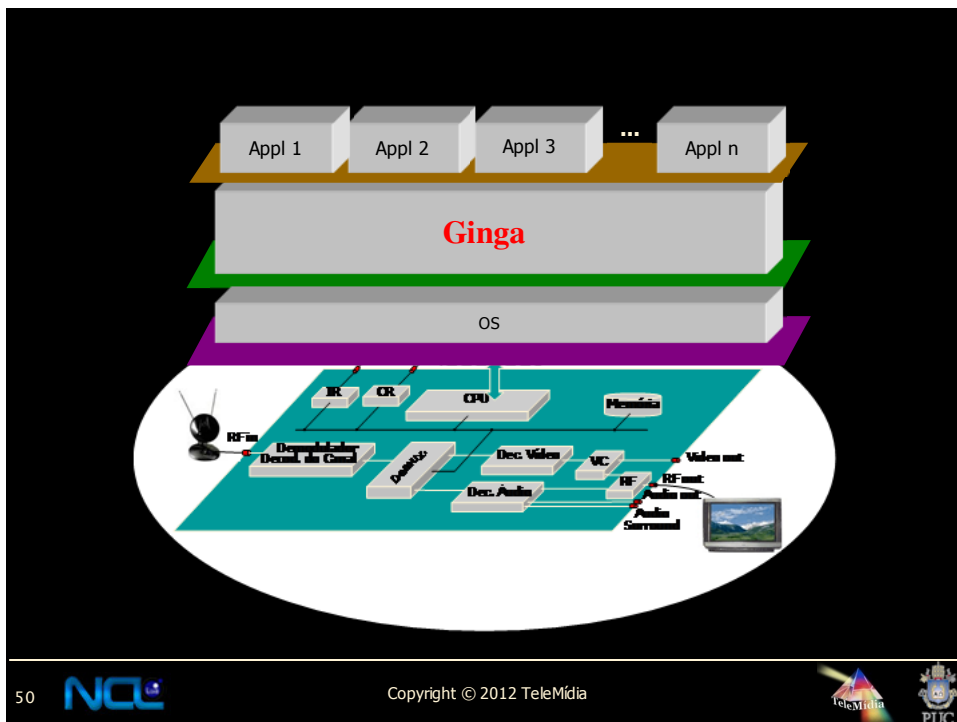
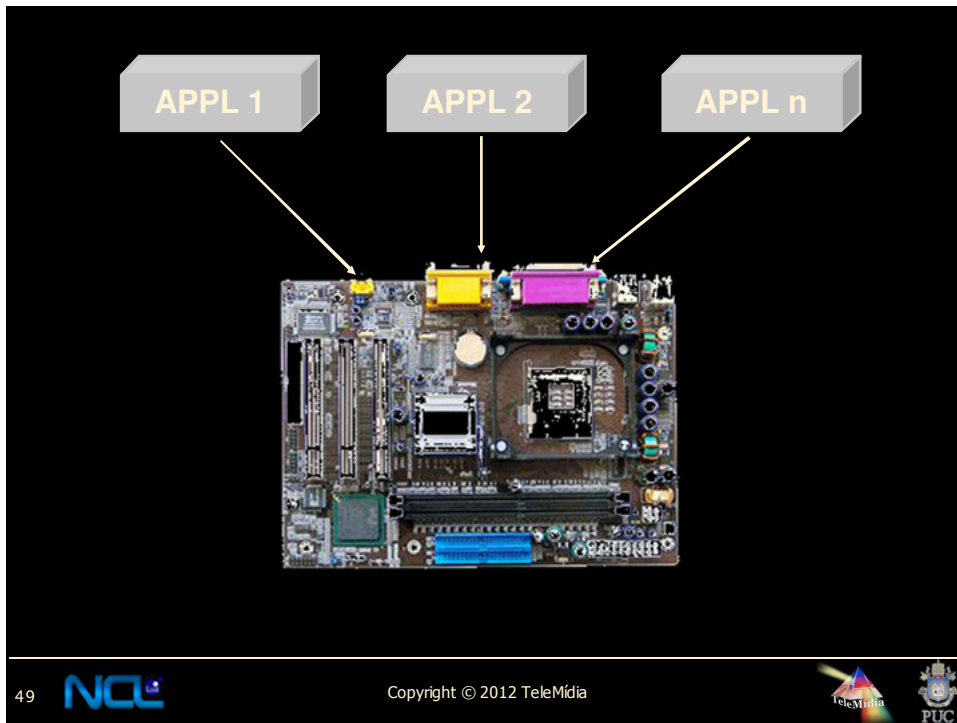


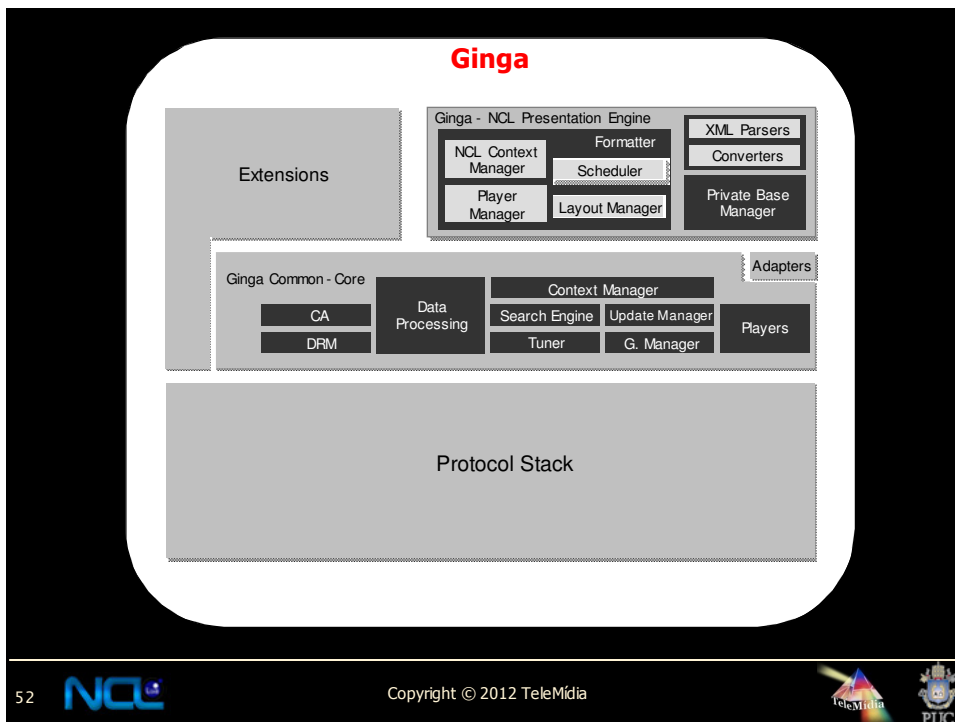
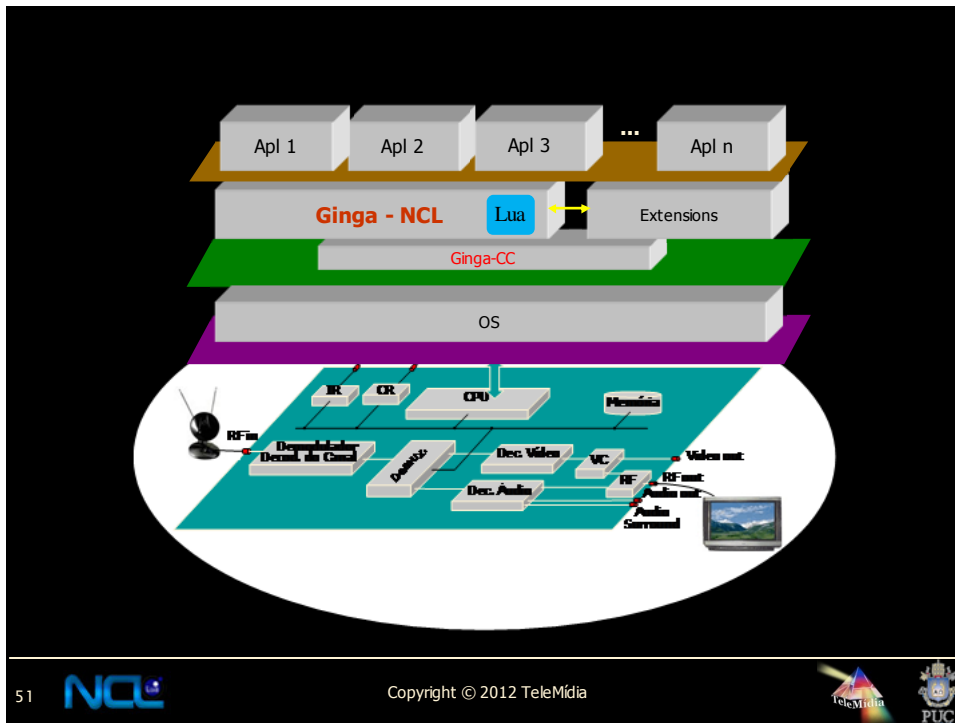
48

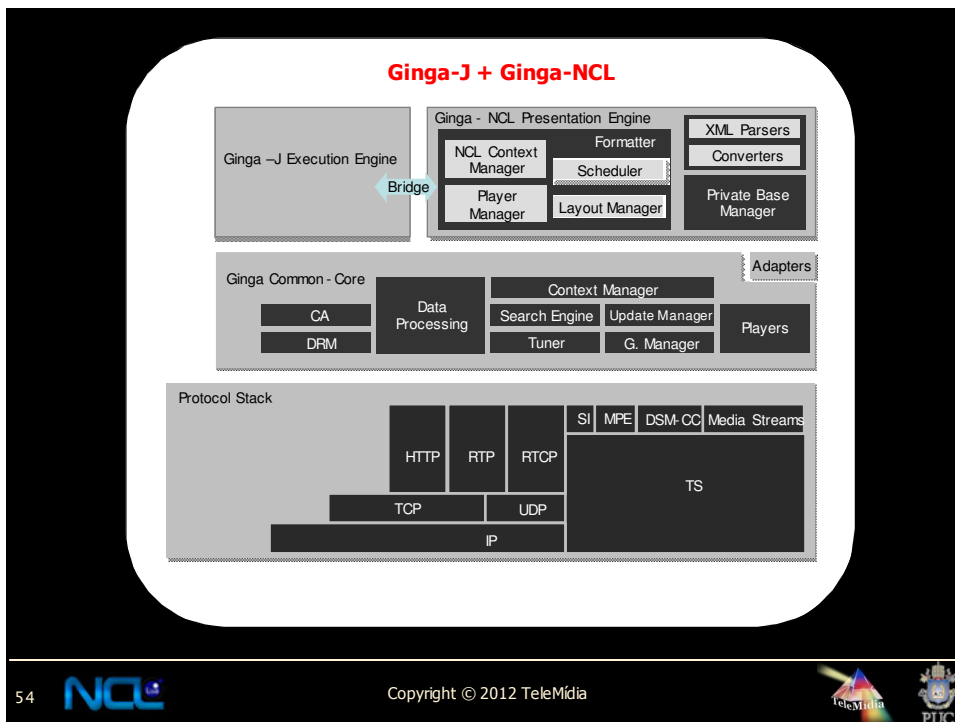
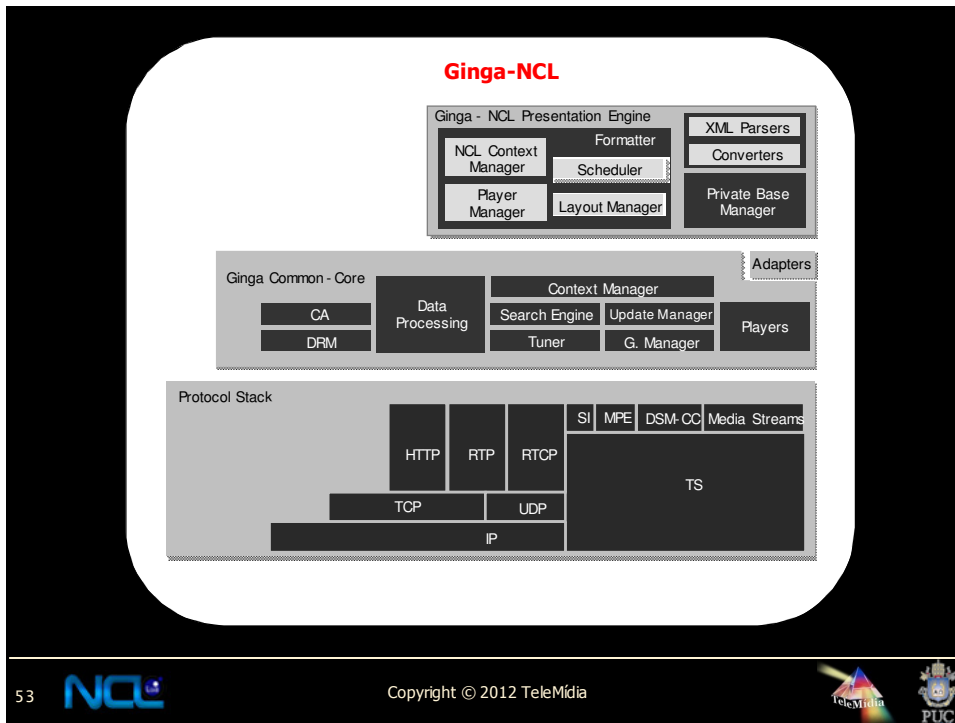


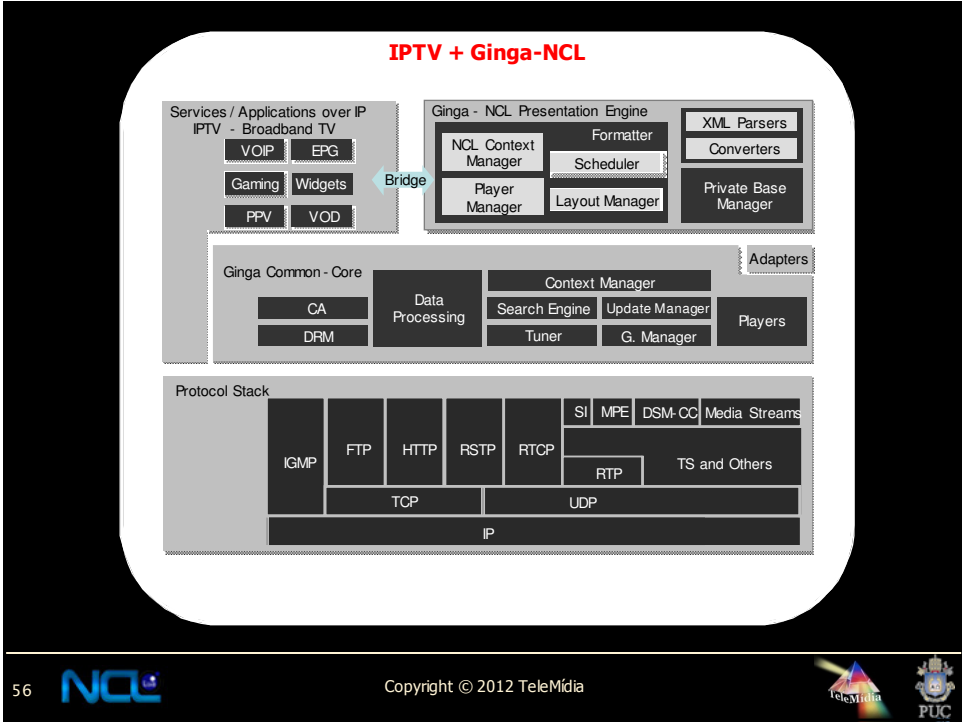
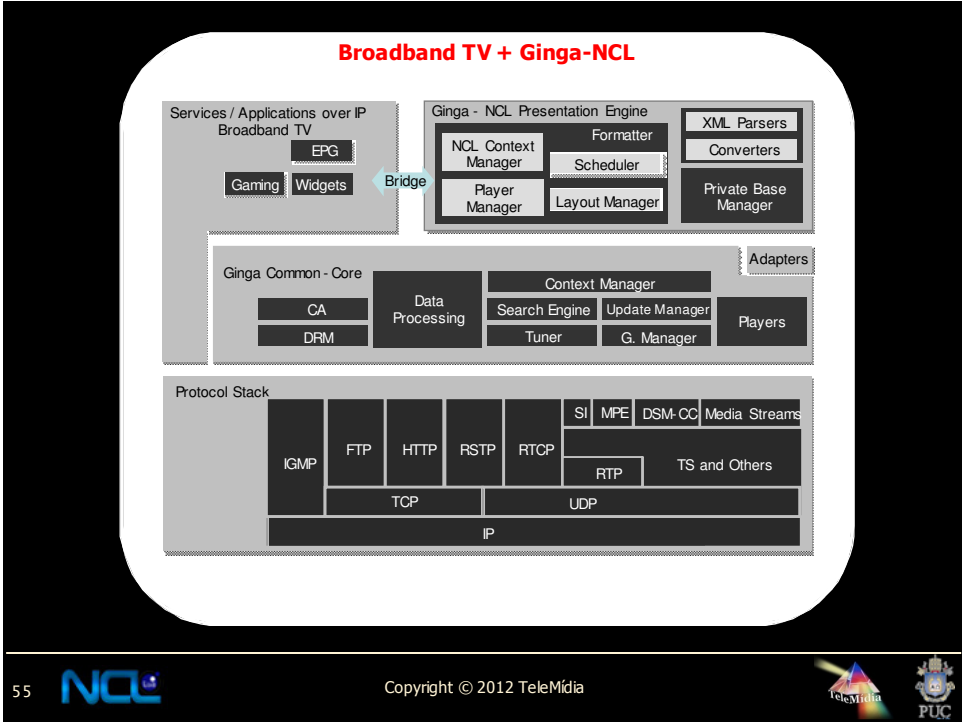
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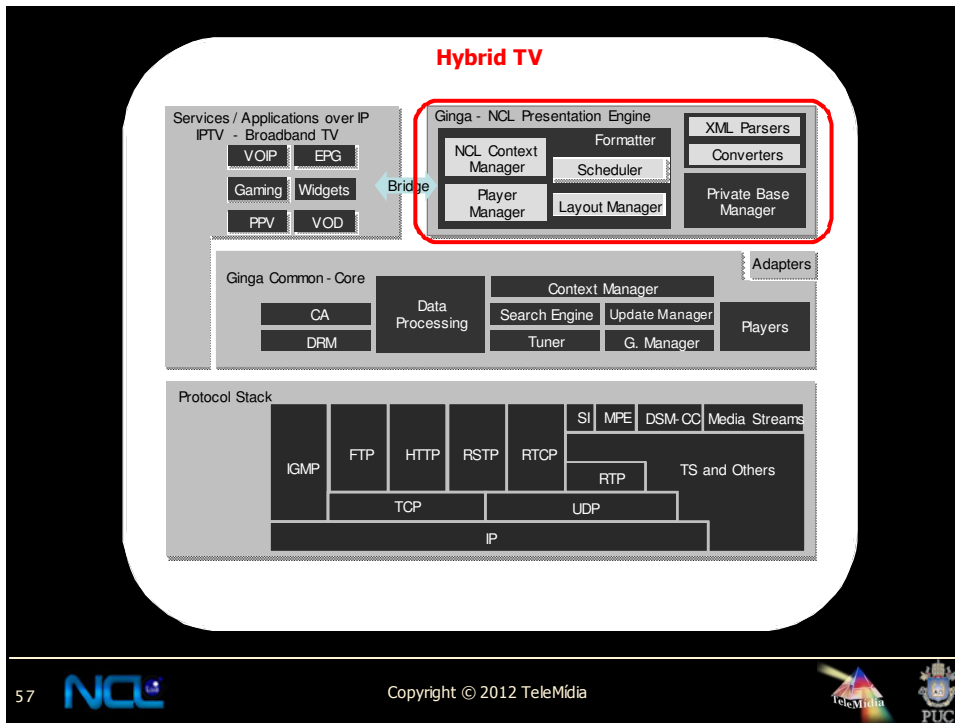












Middleware Requirements

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Synchronization



Interactivity



Interactivity

61

NCL

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TeleMídia PUC

TV is not a Computer

- Broadcast transmission
- Viewers are usually far from the screen and interact via remote control devices
- Usually more than one viewer

Viewer interaction must be treated as just an example of temporal synchronization

62

NCL

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TeleMídia PUC

TV is not a Computer

- Broadcast transmission
- Viewers are usually far from the screen and interact via remote control devices
- Usually more than one viewer
- Video based applications

**Structure-based
synchronization**

63



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TV is not a Computer

- Broadcast transmission
- Viewers are usually far from the screen and interact via remote control devices
- Usually more than one viewer
- Video based applications

Multiple Exhibition Devices

64



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Single Exhibition Device



Single Exhibition Device



Multiple Exhibition Devices



Multiple Exhibition Devices



Adaptation



Adaptation



Adaptation






The image shows a television set on a stand. The screen displays a soccer game. A player in a yellow jersey has a Beba Guaraná bottle graphic overlaid on his back. The text 'Beba Guaraná' is written below the graphic. In the top right corner of the screen, the NCL logo and the text 'NESTED CONTEXT LANGUAGE' are visible. A hand holding a white remote control is visible in the bottom right corner of the frame.

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Content and Presentation Adaptation

- Presentation device
- User profile
- User location

Adaptability

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	TV	TV (cable)	Tel. Fixed	Mobile	Computer	Computer + Internet	Has never used a Computer	Have never used the Internet
TOTAL	98%	25%	34%	88%	46%	40%	41%	45%
Urban Area	99%	28%	38%	90%	51%	44%	36%	39%
Rural Area	93%	7%	11%	72%	15%	10%	71%	77%
Class A > R\$ 4.151,00	100%	85%	87%	99%	98%	97%	5%	5%
Class B	100%	53%	63%	98%	84%	78%	14%	17%
Class C	99%	20%	32%	92%	44%	36%	40%	45%
Class DE < R\$ 1.245,00	92%	3%	9%	69%	9%	6%	74%	80%

73  Dados de 2012/2013, publicado em 06/2013 pelo CGI.br  

Specification Language

- Simple to be understood and learned
- Lightweight
- Powerful

Programming Paradigms

- Imperative (procedural)
 - algorithm specification: “how to do”
 - more expressiveness
- Declarative
 - specification: “final intention”
 - highest level specification

75



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Specification Language

- Simple to be understood and learned
- Lightweight
- Powerful
- Declarative DSL language

76



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NCL Nested Context Language

- The Brazilian innovation in the ISDB System:
 - NCL (Nested Context Language) declarative language
 - Its script NCLua language
 - Its engine: Ginga-NCL *middleware*.
- ITU-T H.761 Recommendation for IPTV services
- ITU-R BT 1691-1 Recommendation for Terrestrial DTV

77



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Functionalities – Declarative support to:

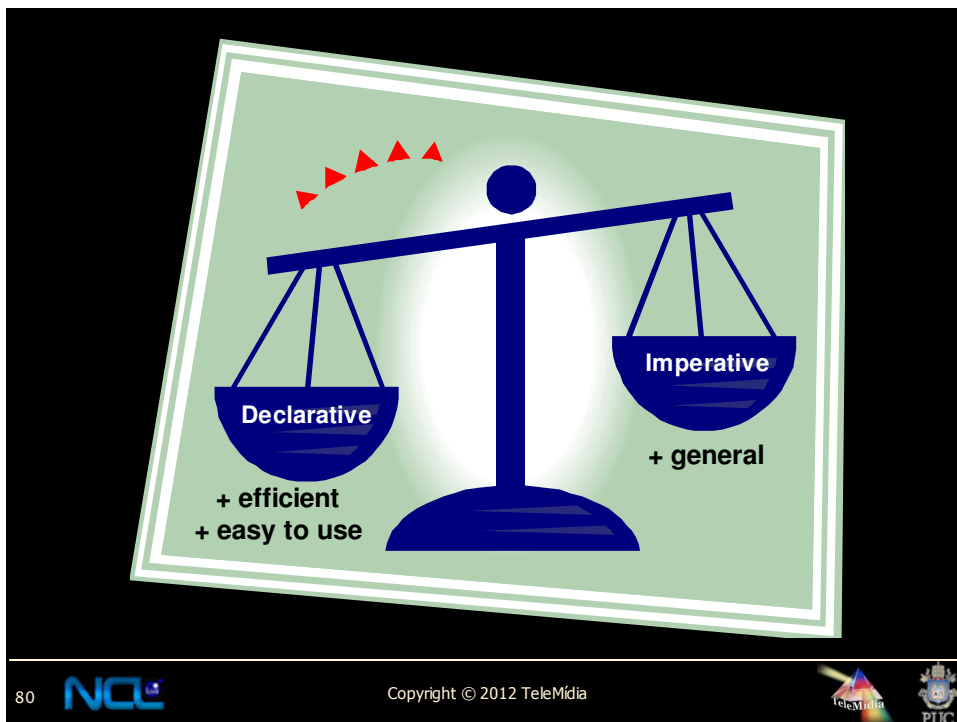
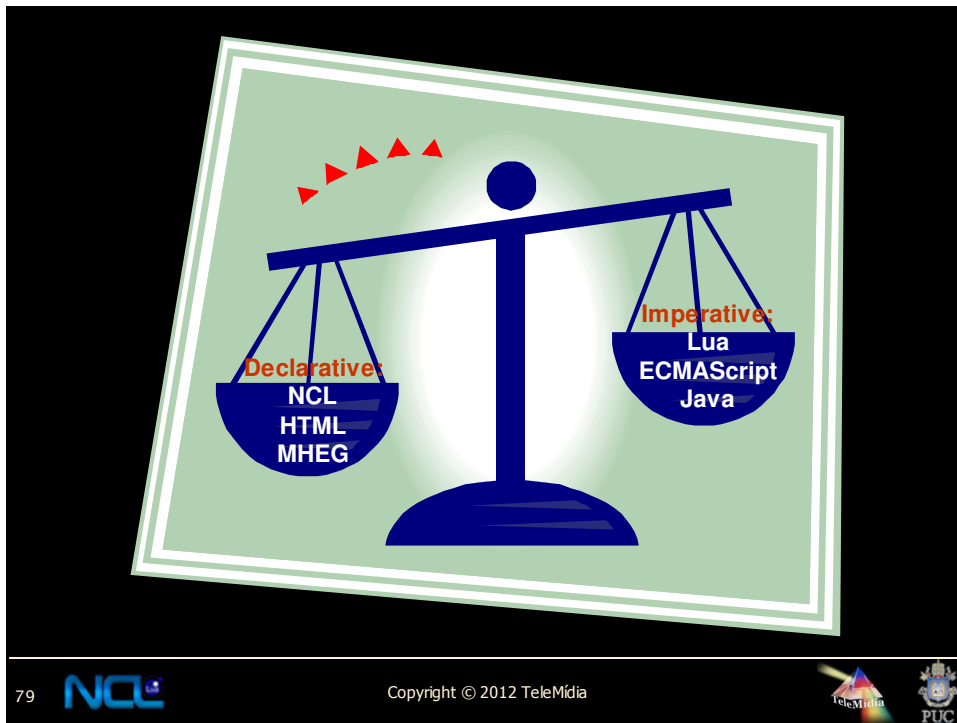
- Media synchronization
 - Interactivity as a particular case
- Adaptability
- Different distribution networks
- Multiple exhibition devices
- Live edition

78



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Declarative X Imperative

Declarative

Imperative



81



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Declarative X Imperative

Declarative

Imperative



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Declarative X Imperative

Declarative

Imperative



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State of the art – Declarative *Middleware*

- Focus on interactivity
 - Synchronization and adaptability by using scripts (procedural)

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Declarative X Imperative



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Why NCL?

NCL

86



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NCL – Nested Context Language

- Synchronization support
 - Structure-based synchronization
 - Interactive channel support
- Multiple device facilities
- Support for content and presentation adaptation
- Live editing support
- **NCL is free software**

87



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Declarative X Imperative

Declarative

Imperative



NCL

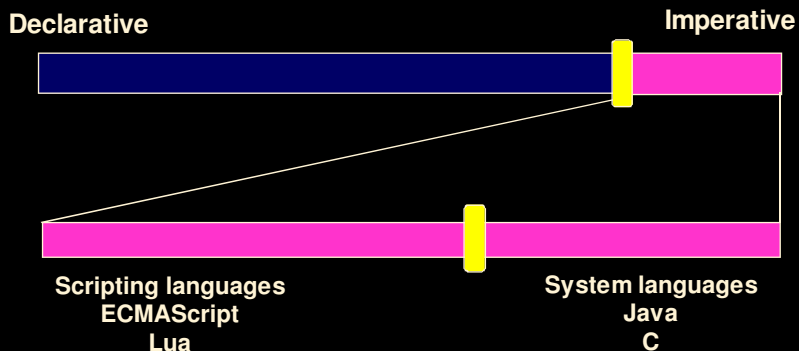
88



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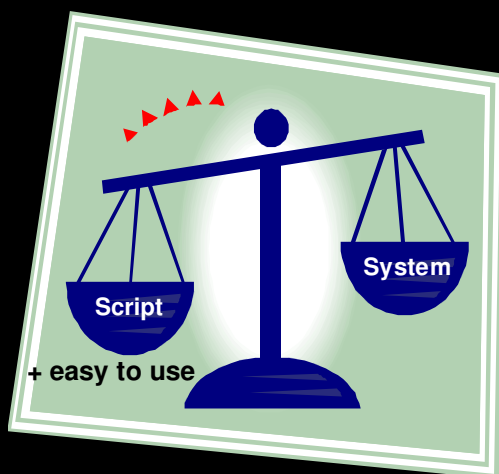
Declarative X Imperative



89



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Efficiency?
Footprint?

Problem dependent

90



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Script X System

Script

System



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Script X System

Script

System



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Script X System



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Ginga Options



Small to medium complex tasks: Lua

High complex tasks: Java

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Opções Ginga

Lua

Java



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Why Lua?



96



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Why Lua?



- ✓ Lua is Simple and Powerful
- ✓ Lua is Portable
- ✓ Lua is Embeddable
- ✓ Lua is Fast
- ✓ Lua is Robust
- ✓ Lua is Free Software

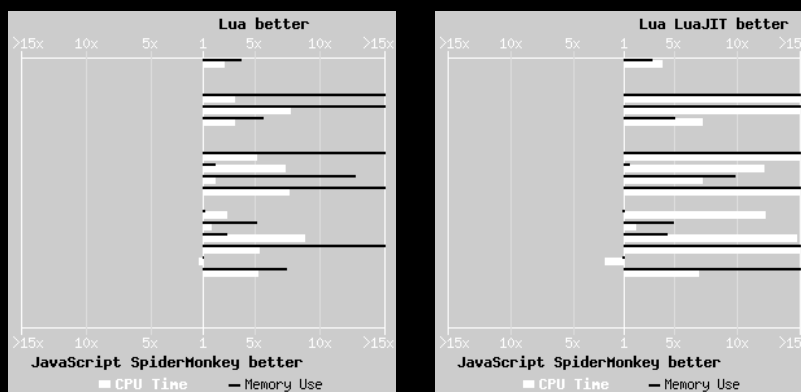
97



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<http://shootout.alioth.debian.org>



JavaScript SpiderMonkey = 936 Kbytes
Lua = 120 Kbytes
LuaJIT = 150 Kbytes

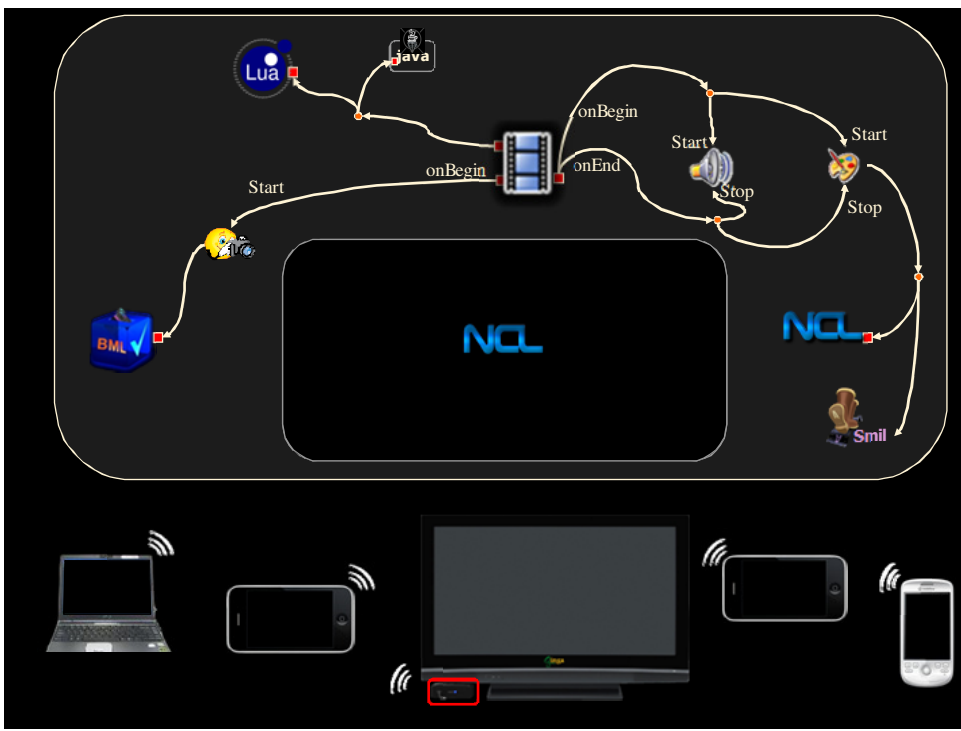
98



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Alguns Jogos Usando Lua



Final Remarks



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NCL Eclipse

The screenshot shows the Eclipse IDE interface. The main editor displays NCL code for a component named '01sync.ncd'. The code includes XML tags for regions, descriptors, and connectors. The 'Problems' view at the bottom shows four errors related to the 'connector' element in various NCL files.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!-- Exemplo de sincronismo sem a interacao do usuario -->
<ncml id="01sync" xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
  <head>
    <regionBase>
      <region id="backgroundReg" width="100%" height="100%" zIndex="1"/>
      <region id="screenReg" width="100%" height="100%" zIndex="2">
        <region id="frameReg" left="5%" top="6.7%" width="18.5%" height="18.5%" zIndex="3"/>
      </region>
    </regionBase>
    <descriptorBase>
      <descriptor id="backgroundDesc" region="backgroundReg"/>
      <descriptor id="screenDesc" region="screenReg"/>
      <descriptor id="photoDesc" region="frameReg" explicitDur="5s"/>
      <descriptor id="audioDesc"/>
      <descriptor id="drabbleDesc" region="frameReg"/>
    </descriptorBase>
    <connectorBase>
      <connectorBase documentURI="..causalConnBase.ncml" alias="conEx"/>
    </connectorBase>
  </head>
  <body>
    <port id="entry" component="background"/>
    <media id="background" src="..media/background.png" descriptor="backgroundDesc"/>
    <media id="animation" src="..media/anim0ar.mp4" descriptor="screenDesc"/>
  </body>
</ncml>
```

Description	Resource	Path
Papel <var> nClO definido no elemento <connector (conEx:conBeginWarStart)>	07settings.ncd	Livro TV/Exemplos
Papel <var> nClO definido no elemento <connector (conEx:conBeginWarStart)>	08transition.ncd	Livro TV/Exemplos
Papel <var> nClO definido no elemento <connector (conEx:conBeginWarStart)>	09transition.ncd	Livro TV/Exemplos
Papel <var> nClO definido no elemento <connector (conEx:conBeginWarStart)>	10menu.ncd	Livro TV/Exemplos

102



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NCL Composer

The screenshot displays the NCL Composer application window. It features several panes:
- **NCL Textual View:** Shows XML code for defining components like 'area', 'port', 'media', and 'link'.
- **Structural View:** A graphical diagram showing the hierarchical relationships between the components defined in the XML.
- **Outline View:** A tree view listing the components and their sub-elements, such as 'media (m1)', 'area (area1)', 'port (p1)', and 'link (link1)'.
- **Properties View:** A table for editing the properties of the selected component.
- **Layout View:** A workspace for visualizing the components in a specific layout.
- **Validator Plugin:** A panel showing validation errors, such as 'Invalid data type...' for various elements.

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Player Ginga-NCL

The screenshot shows the Player Ginga-NCL application. It features a logo on the left and a navigation bar at the bottom with various icons for playback control.

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Ginga-NCL is free software



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Ginga Communities



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Ginga-NCL Reference Implementation

- C++ Language
 - Linux platform
 - High performance
 - Hard to embed



107 

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Ginga4Windows



108 

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Ginga4MAC



109 NCL

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Ginga-NCL Virtual Set-top Box

NCL
Networked Context Language

Your Ginga-NCL Set-top box is ready for action!

Quick hints:

- From your host operating system, use SSH to open a text console. The STB's IP address is shown below.
- User is "root"; Initial password is "telemidia"
- Upload your NCL applications and media to the /misc/nc130 directory, via SFTP or SCP
- Use the /misc/launcher.sh script to run your NCL application
Example: `/misc/launcher.sh /misc/nc130/sample03/sample03.nc1`
- Use the following keymap:
- Have fun!

IP:192.168.127.129

middleware
Ginga
TV Interativa se faz com Ginga!

To direct input to this virtual machine, press Ctrl+G.

110 NCL

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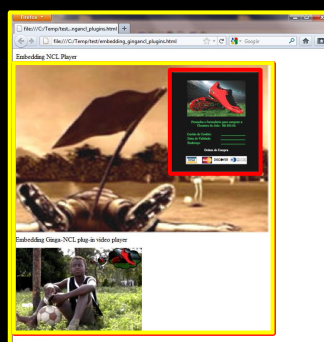
Ginga -NCL para IPTV

- IPTV: Recommendation H.761
 - Symbian
 - Android



Pesquisa em Linguagens e Players

- Interoperabilidade: *Liaison* ITU-T/W3C
 - NCL como linguagem de cola
 - NCL como plug-in Web



Plug-ins Ginga

Ginga

Ginga

Broadband (IP) TV

113 NCL

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NCL Evolution

NCL

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NCL 4.0

- NCL 4.0
 - Higher level abstraction for relationship definitions
 - Better support to context aware applications
 - Support to multimodal interfaces

Africa do Sul 2010



NCL 4.0

- NCL 4.0
 - Higher level abstraction for relationship definitions
 - Better support to context aware applications
 - Support to multimodal interfaces
 - Support to 3D objects
 - Multiple devices
 - Social media

117 NCL

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NCL 3D Profile



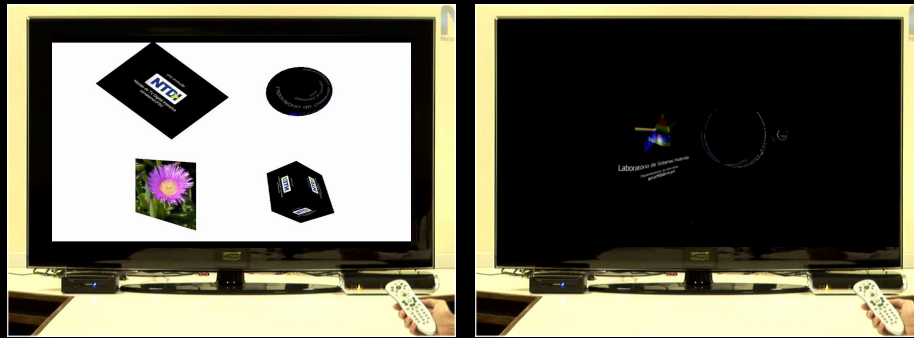
- Today NCL only allows media object exhibition on two dimensional rectangular regions.
- The next step is to allow defining media object presentation on 3D surface.

118 NCL

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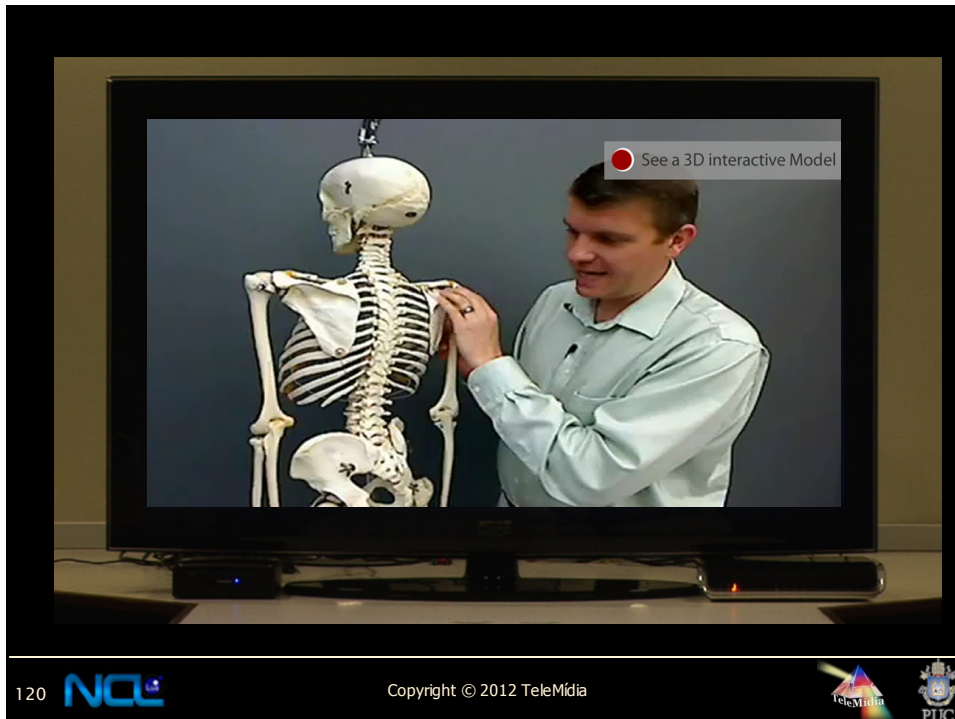
NCL 3D Profile



- As a glue language NCL should also be able to embed 3D objects, specified in another 3D language, like X3D.
- This 3D objects should be able to relate with other 2D and 3D objects, in the same or different 3D world.
- Moreover, the presentation should take profit of the multiple device facility of NCL in a true virtual environment, moving social applications one step ahead.

119 NCL

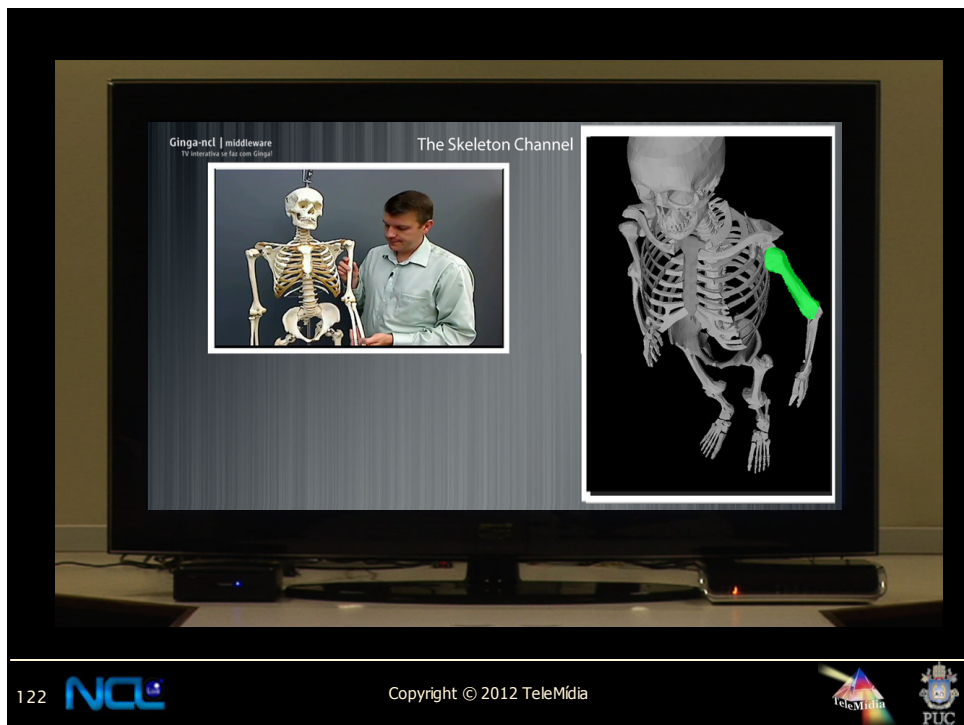
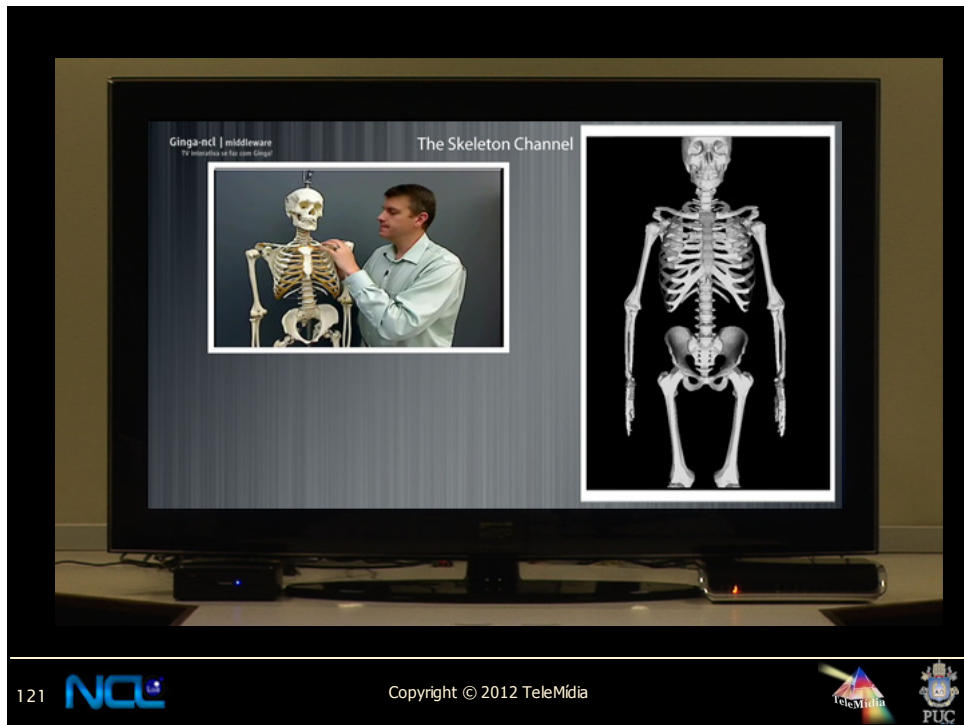
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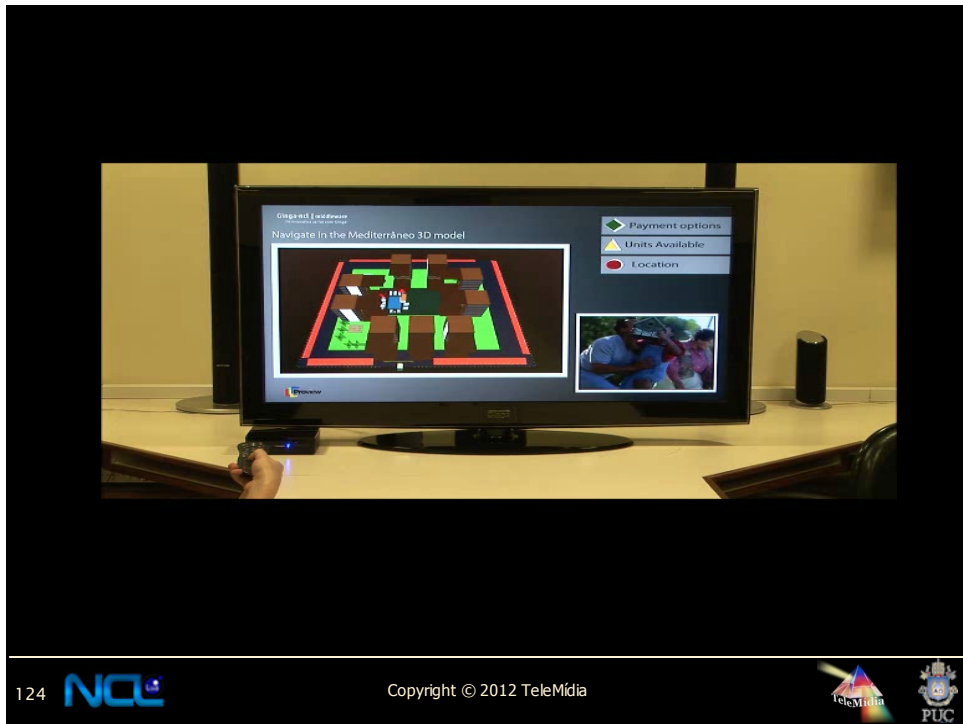
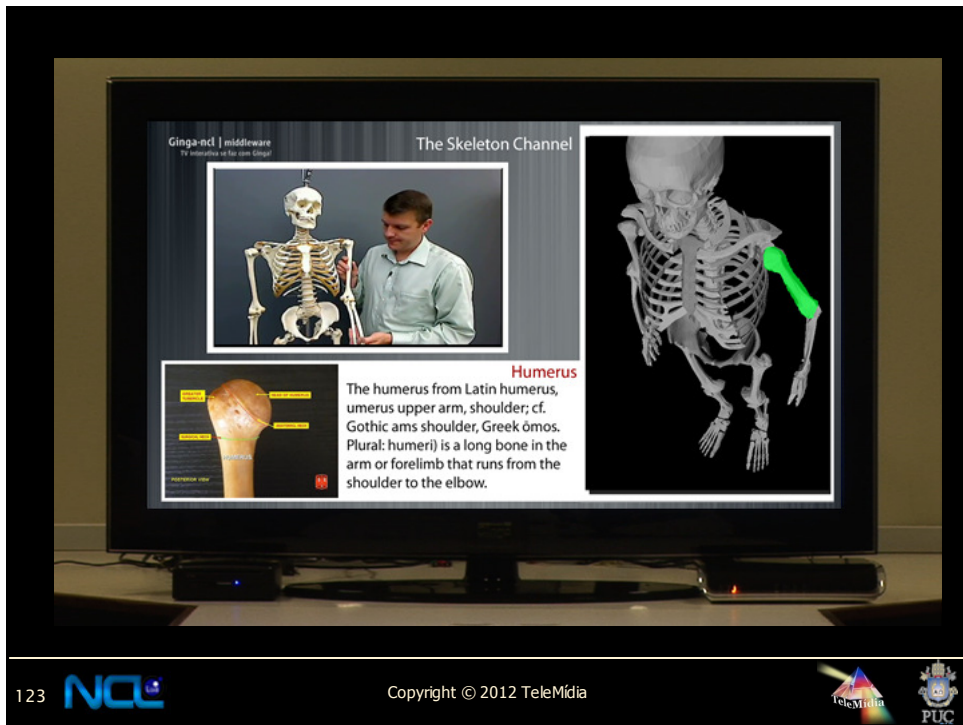


120 NCL

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