Software libero per la tv digitale

Bologna 12.6.2009,

Conferenza software libero 2009

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Who's Avalpa

Avalpa is a private company based in Italy

Andrea Venturi
electronic engineer
administrator

Lorenzo Pallara
computer science Ms.C.
technical director

degree in 1993
in **Cineca** since 1996
in **nextra** in 1999-2001

degree in 2001
in **Cineca** since 2003
Milestones Srl 2002
Trecision Spa 2001

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Avalpa mission

Avalpa has the mission to make digital television switch over an event full of renewal opportunities for all the television stakeholders, revolutioning roles, expectations and rewards of anyone (including our competitors..).

The scenario is european and global; for example: **100 million tru2way Decoders in US.. 50 million Blu Ray Players**

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Italian issue^Wopportunity

- Still more then 5 hundred of tv broadcaster
- 5 million of MHP (java) STB and growing
- A tv digital switchover ongoing
- Terrestrial and Sat players fighting in a big way
- Implementations someway closed and broken
- Twenty years of “stability”..

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The long story of a new-born company

Avalpa is born from the ideas of the two co-founders grown up during their long time experience in **Cineca**.

Since 2004 the founders have been working on digital television, creating a wealth of software and solutions, with an increased market return.

- Software JustDvb-It carousel m@p
- T-islessia project, financed

Fondazione Ugo Bordoni

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Key technologies

Avalpa people master these key technologies:

- MPEG2 system TS & AV
- MPEG4 (DVB, Blu Ray)
- Java (mobile embedded), MHP
- Embedded Linux
- IP (internet protocol)

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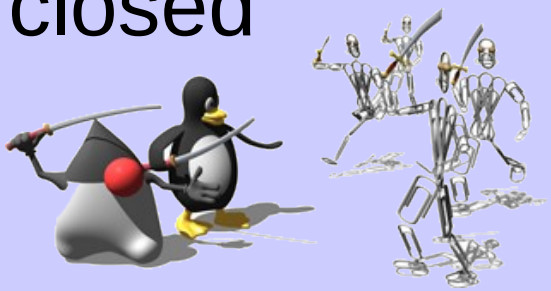
The digital tv scenario

The market: many broadcasters looking for transition to digital

End users: all the people going to virtual entertainment thanx to the economic turmoil!

The competitors: few large techie companies providing bloody expensive and closed solutions.



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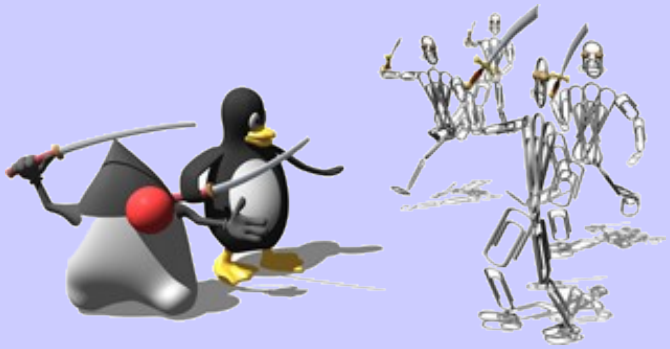
The strategy

Avalpa is developing along these simple lines:

- Sharing abundant resources (free & *open software*)
- Adding value to scarce goods (time, content, skills)
- *Bottom up* approach
- “Keep it simple”
- Rapid prototyping
- Component on the shelf



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Where are we different?

Most competitors in this market are proprietary, slow and thin.

Avalpa delivers an <u>open</u> convergent approach

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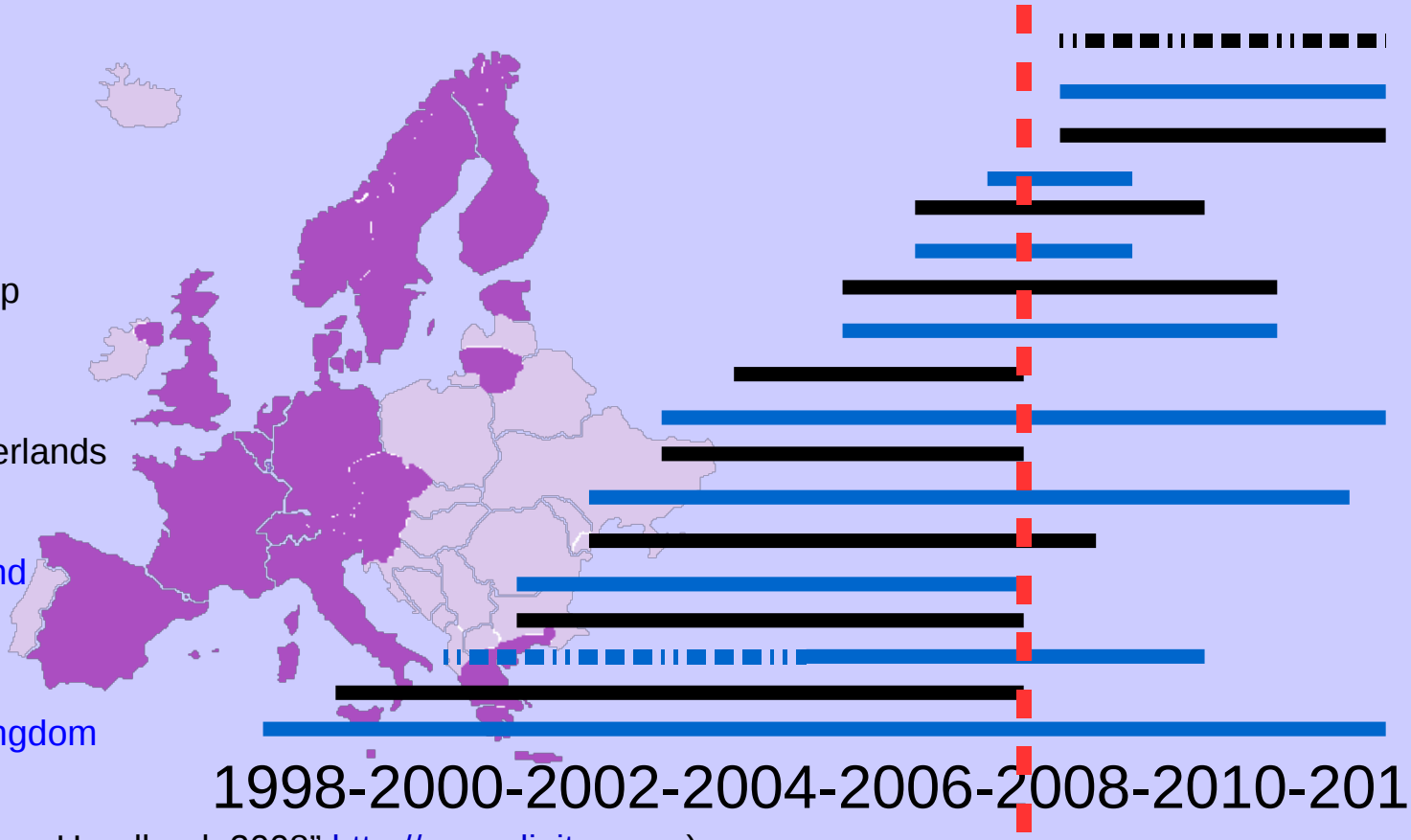
Digital switch over timeline



(source “Aso Handbook 2008” http://www.digitag.org)

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Example: Italy market

- Digital tv (interactive)
  - Broadcaster (more than 500 in Italy)
  - Public administration
  - Hospitality (Hotel, residential)
- Blu ray disk (interactive)
  - Content producer (animation)
  - Public administration (educational)
  - Press (gadget for newspaper)

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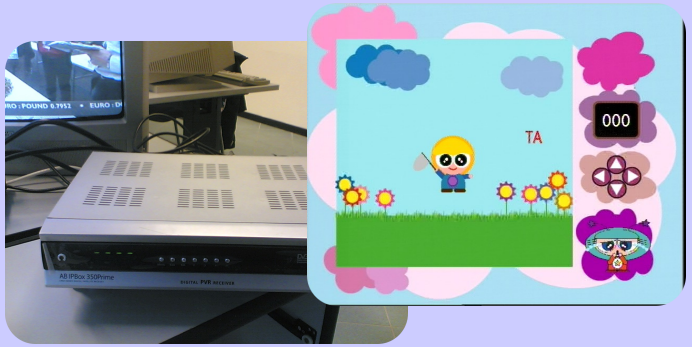
The product..

2 “technologies” live at the core of Avalpa proposition for interactive television both live and packaged (DVB MHP, tru2way BluRay BD-J):

- **OpenCaster**: DVB server
- **JET**: DVB Java middleware



Properly integrated and customized, deliver reliable services for many customers issues

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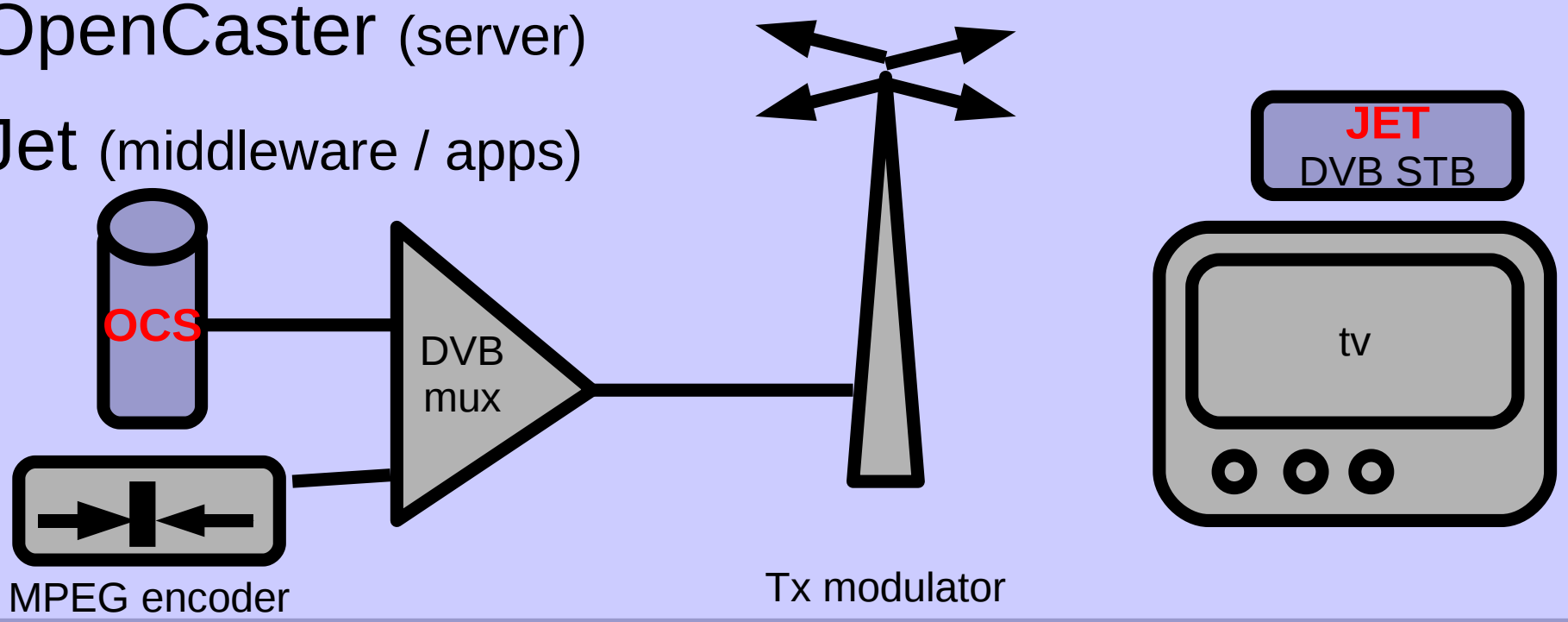
High level design

Avalpa free software cover both the side of digital television

- OpenCaster (server)
- Jet (middleware / apps)



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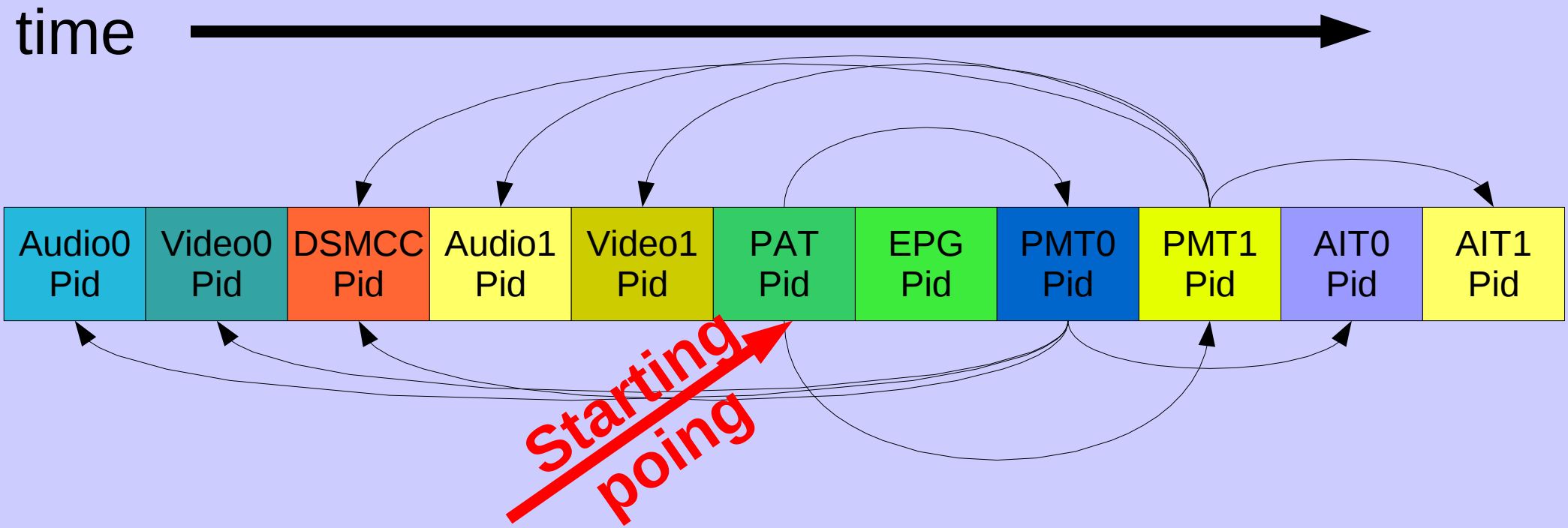
Ts multiplex

Many audio visual services in a row splitted in packets
188 bytes long, starting with 0x47 (funny!)



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Avalpa's silver bullets: OpenCaster

- GPL v2 open source professional MPEG2 transport stream generator with audio/video multiplexing
- interactive television support (MHP MHEG Tru2way)
- Third parties different vendors hw output support for DVB-T and DVB-ASI
- Presented as ACM Paper “An Open Source Software framework for DVB-* transmission”

- "*OpenCaster is an amazingly well-designed set of tools. From creating your own descriptors to multiplexing H.264 video streams, it lets you control the whole process of DVB stream generation*. - Antoni Roszak, Osmosys"

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Avalpa's silver bullets: OpenCaster

The first fully digital television with interactive services generated by Opencaster is broadcasted on Italy DVB-T **since 2005:**

Lepida TV by Lepida SPA, branch of Regione Emilia Romagna

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How OpenCaster works

The basic guidelines:

- **Command line config**
- **Many simple tools (ts...something)**
- **Fifo connections**
- **Python for tables & structure descriptions**
- **C for the heavyweight processes**

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An example..

- Few rows of scripting and a continuous stream flows out on the network..

```
tscbrmuxer b:2300000 firstvideo.ts b:188000 firstaudio.ts b:3008
    firstpat.ts b:3008 firstpmt.ts b:1500 firstsdt.ts b:1400 firstnit.ts
    b:1000000 ocdir1.ts b:2000 firstait.ts b:9772084 null.ts>
    myfirstfifo.ts &

tsstamp myfirstfifo.ts 13271000 > mysecondfifo.ts &

DtPlay mysecondfifo.ts -t 110  -mt OFDM -mC QAM16 -mG 1/4 -
    mc 2/3 -mf 578
```

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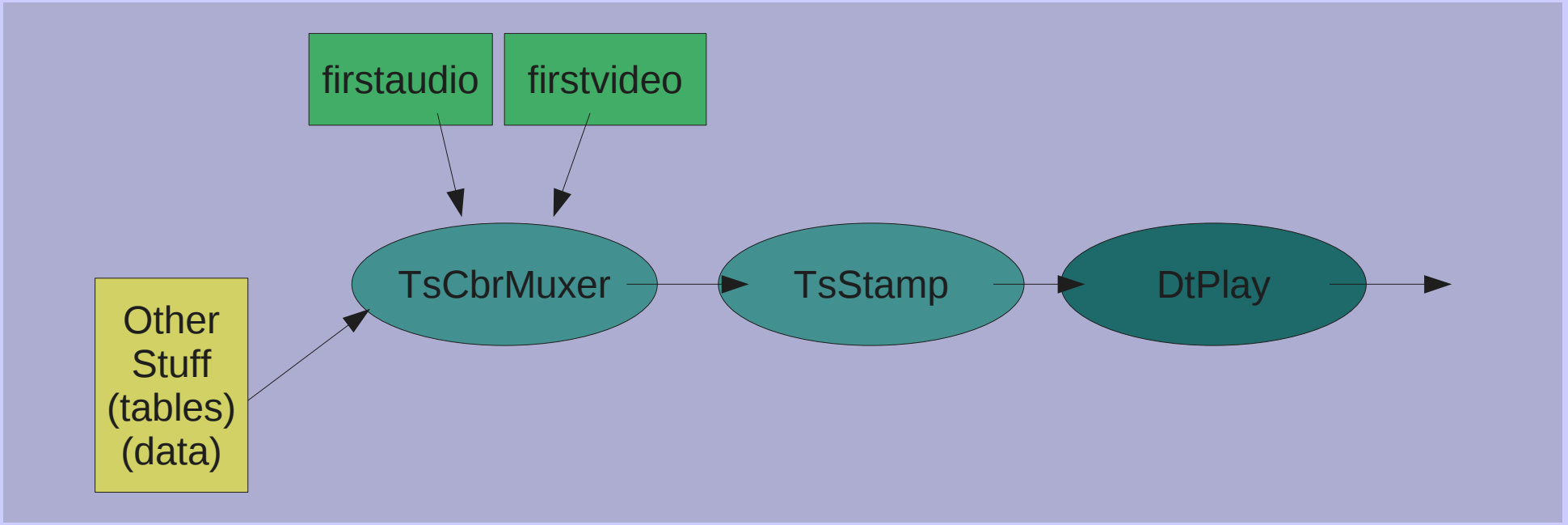
How this stuff works..

A graphical representation of the previous script



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PSI/SI table natural description

A python snippet

```
# Service Description Table (ETSI EN 300 468 5.2.3)

sdt = service_description_section(
    transport_stream_id = 1,      # demo value, an official value should be demanded to dvb org
    original_network_id = 1,      # demo value, an official value should be demanded to dvb org
    service_loop = [
        service_loop_item(
        service_ID = 1, # demo value
        EIT_schedule_flag = 0, # 0 no current even information is broadcasted, 1 broadcasted
        EIT_present_following_flag = 0, # 0 no next event information is broadcasted, 1 yes
        running_status = 4, # 4 service is running, 1 not running, 2 starts in a few seconds,3 pause
        free_CA_mode = 0, # 0 means service is not scrambled, 1 means at least a stream is scrambled
            service_descriptor_loop = [
                service_descriptor(
                    service_type = 1, # digital television service
                        service_provider_name = "Avalpa",
                        service_name = "Avalpa 1",
                ),
            ],
        ),
    ],
)
```

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OpenCaster 2.0

Today, 12.6.2009, a new release!

These are the main new features of OpenCaster 2.0:

- seamless playout of MPEG2 offline encoded videos
- transport stream over IP support for IPTV services
- updated pdf manual with plenty of ecamples and 100 pages (free doc rulez!)

NOW you can do digital television in a box!

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Multimedia playout

Another boring script:

```
pesclock 10800000 0 ed.video.pes video0.pes ed.audio.pes audio0.pes &

pesclock 10800000 0 bb.video.pes video1.pes bb.audio.pes audio1.pes &

pesclock 10800000 0 bb2.video.pes video2.pes bb2.audio.pes audio2.pes &

pesvideo2ts 2064 25 112 2900000 1 video0.pes video1.pes video2.pes > video.ts &

pesaudio2ts 2068 48000 384 1 audio0.pes audio1.pes audio2.pes > audio.ts &

tscbrmuxer b:2800000 video.ts b:188000 audio.ts b:3008 firstpat.ts b:3008
    firstpmt.ts b:1500 firstsdt.ts b:1400 firstnit.ts b:10174084 null.ts > muxed.ts &

tspcrstamp muxed.ts 13271000 > stamped.ts &

DtPlay stamped.ts -t 110 -mt OFDM -mC QAM16 -mG 1/4 -mc 2/3 -mf 578
```

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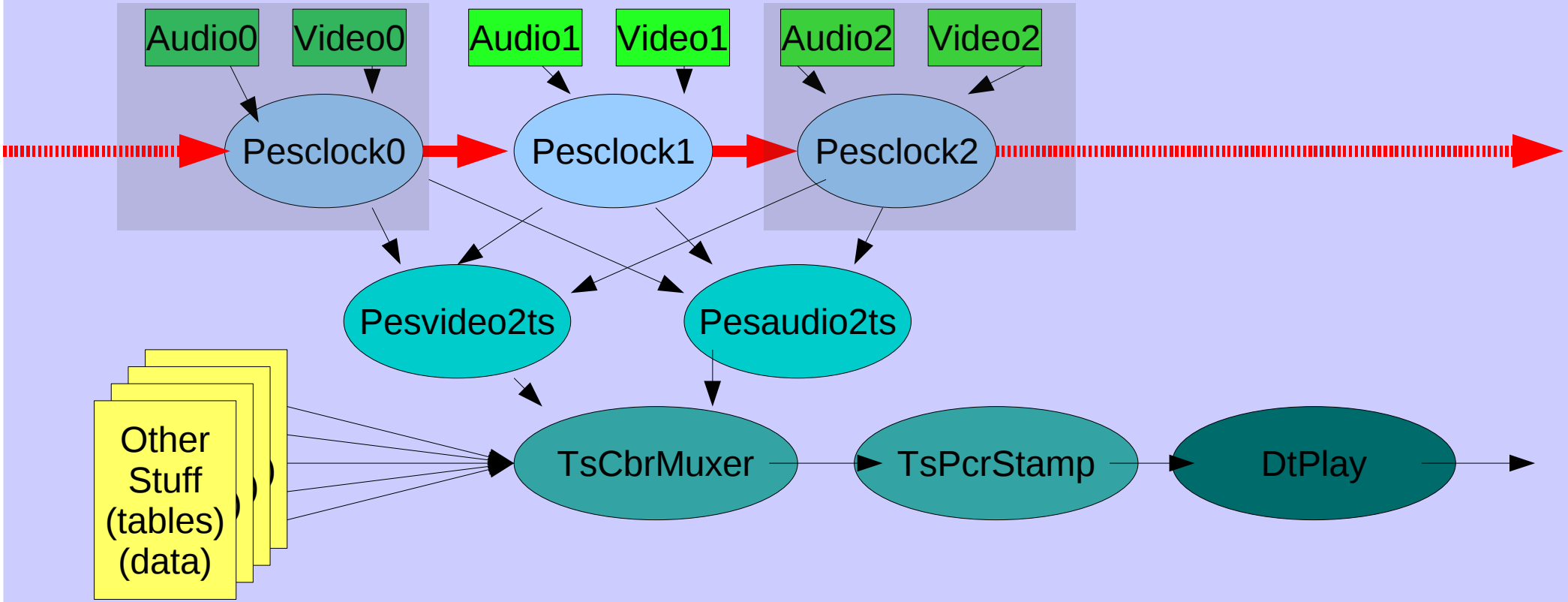

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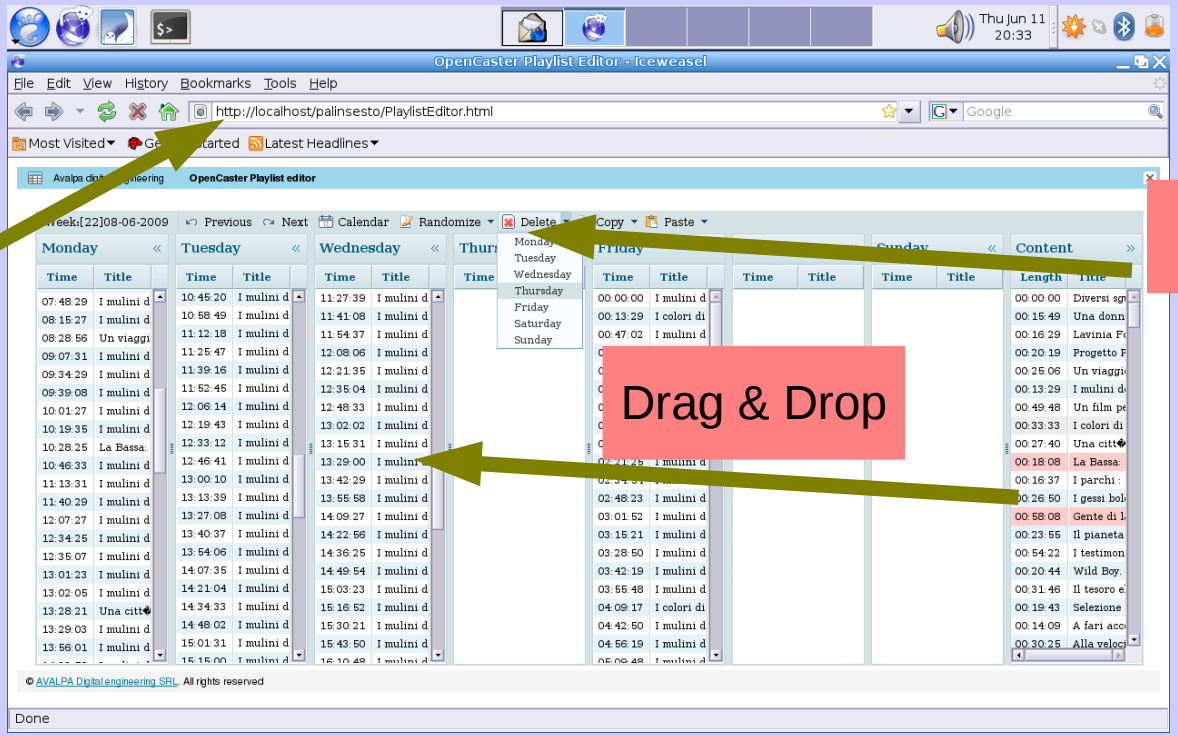
Visual Playlist editor

Next to come: we too believe that a GUI is mandatory for an easy day to day operation!



Web based

Tool bar

Drag & Drop

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Avalpa's silver bullets: Jet

- GPL v2 open source interactive DVB Java middleware
- Based on GPL licensed Sun Microsytems PhoneMe Advanced CDC Personal Basis Profile
- Now, running on IBM's PowerPC Vulcan SOC Stbx25xx
- Tomorrow on HD SOC!

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Avalpa's silver bullets: Jet

- Full control: Linux IBM drivers were greatly enhanced by Avalpa to boost graphic performance (license!?)
- Today targets are Closed User Groups: hotels, kiosks, digital signages, …
- Presented at Java Mobile, Media & eMbedded Developer days, Santa Clara, US, 2008
- Live presentation http://www.ustream.tv/recorded/184826 (from minute 24..)!

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Basic features of Jet

Here some features of actual version 2.4

- Tuning station on DVB-S and DVB-T
- Recording and playback of SPTS streams
- Decoding of data carousel (DSMCC)
- Xlet execution (how long for a MHP stack!?)
- IP networking (http p2p bittorrent)

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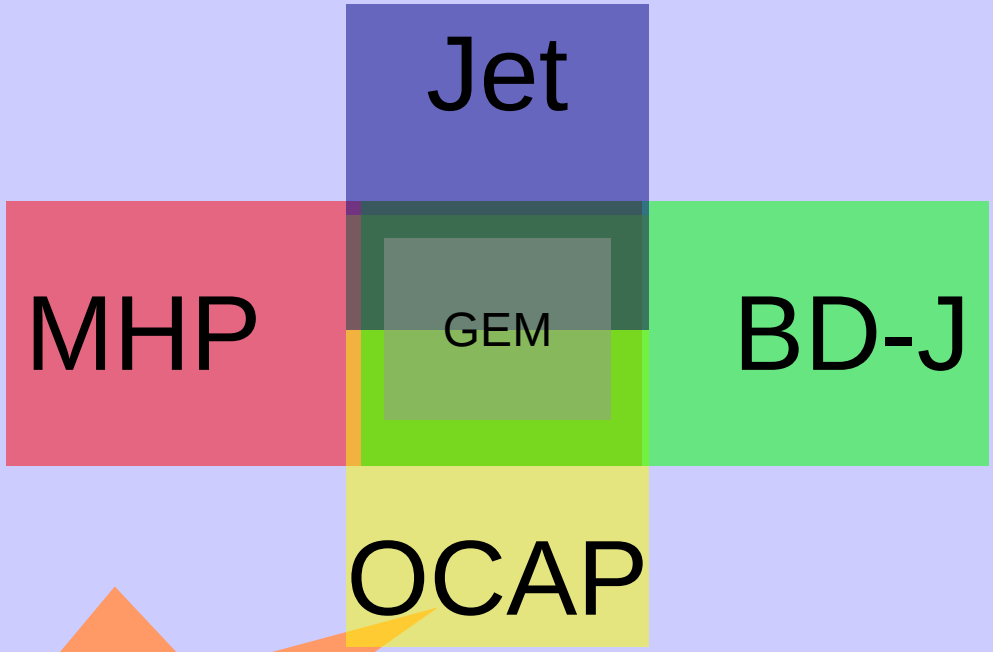
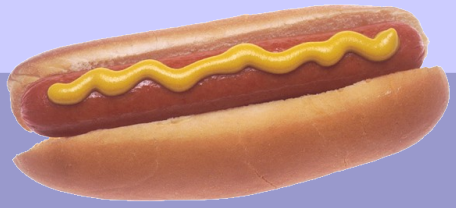
Jet toward industry standard

We are chasing many similar Java based stacks:



Helpfully, OpenCable released the 12.6.2009 an OCAP GPL RI!!



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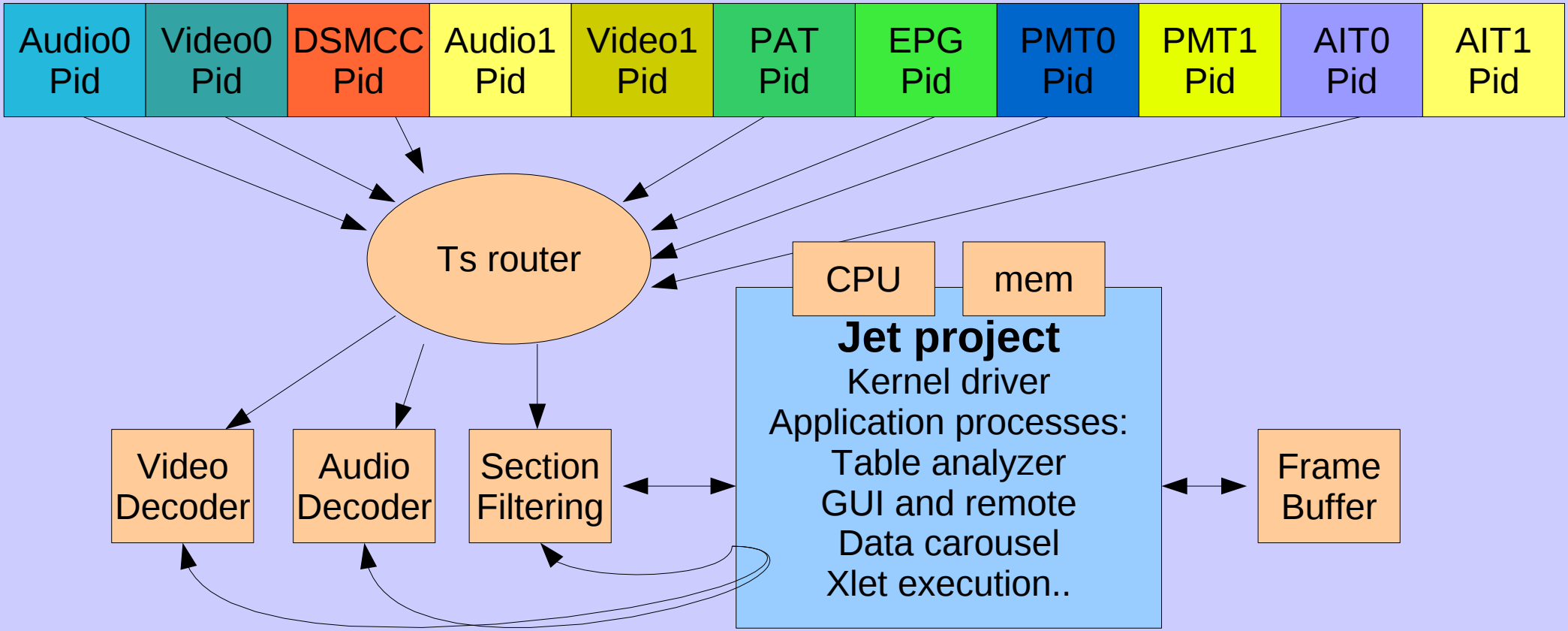
SOC HW & SW



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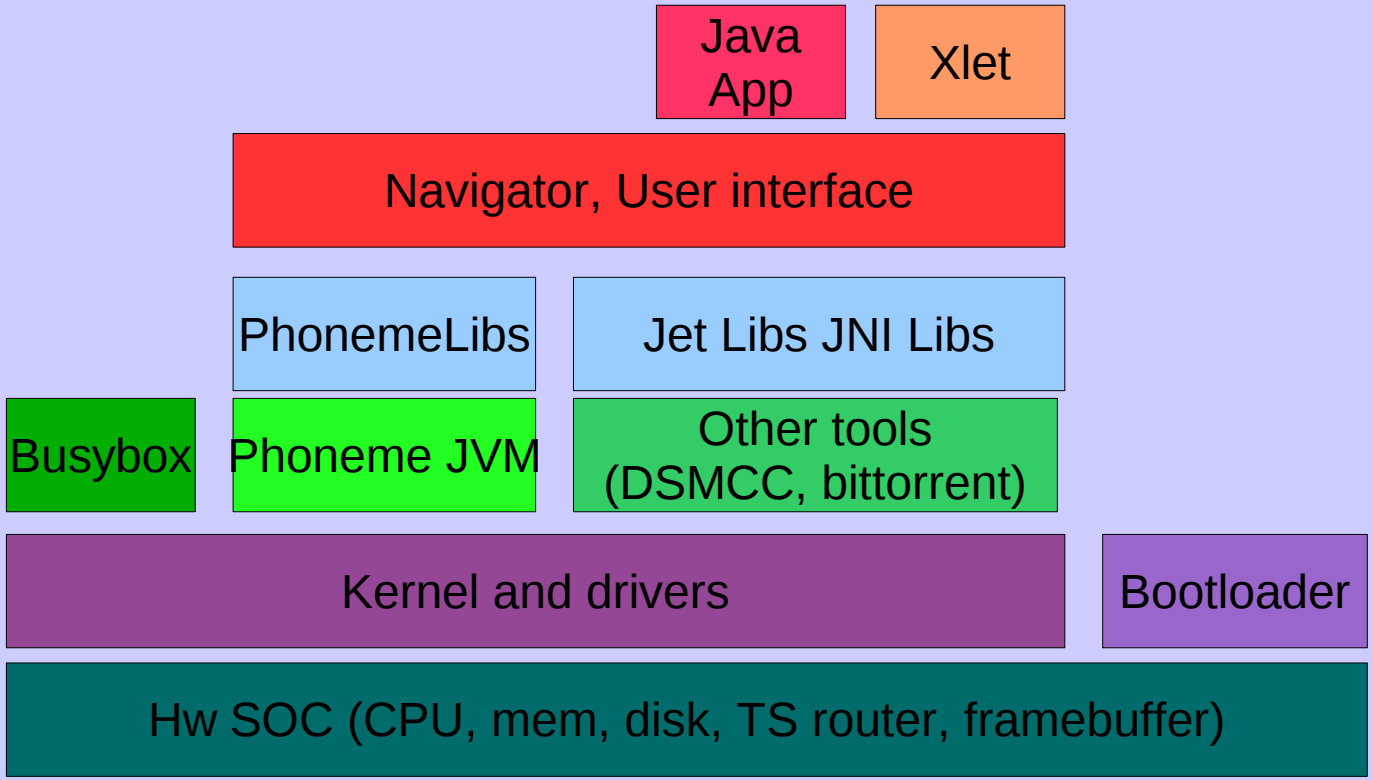
Jet easy design

Functional macroblocks



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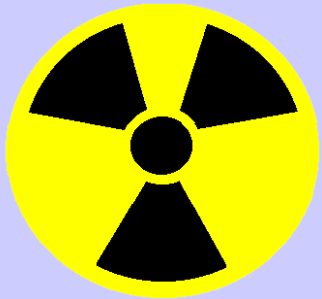
Programming a SOC

First step: Kernel level activity! Not for the faint of heart

- Squeeze every bit from a low power device
- Missing info (few docs, broken ref. source)
- R.E., writing and debugging kernel modules
  - IRQ handling,
  - Physical addressing,
  - Byte endianess



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JNI Programming

Second stage: how to connect the HW devices to the Java virtual machine!

- Writing Java native interface libraries (in C)
- Interfacing to external processes, for example:
  - DSMCC filesystem decoder,
  - Iframe decoder,
  - bittorrent daemon

How to write an UI

Third step of the perfect STB!

- Design and code an UI with simple and reliable menu system
- Decode and parse input from the DVB network
- Catch all the async events in every FSM state (support the front power button properly..)

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Other tasks

More things are to be supported, for an industrial STB:

- Study best Flash and memory mapping
- Support upgrade on the air
- Working on bootloader and other system tasks
- Testing of the Java libraries (against suite)
- Usability design and graphical development

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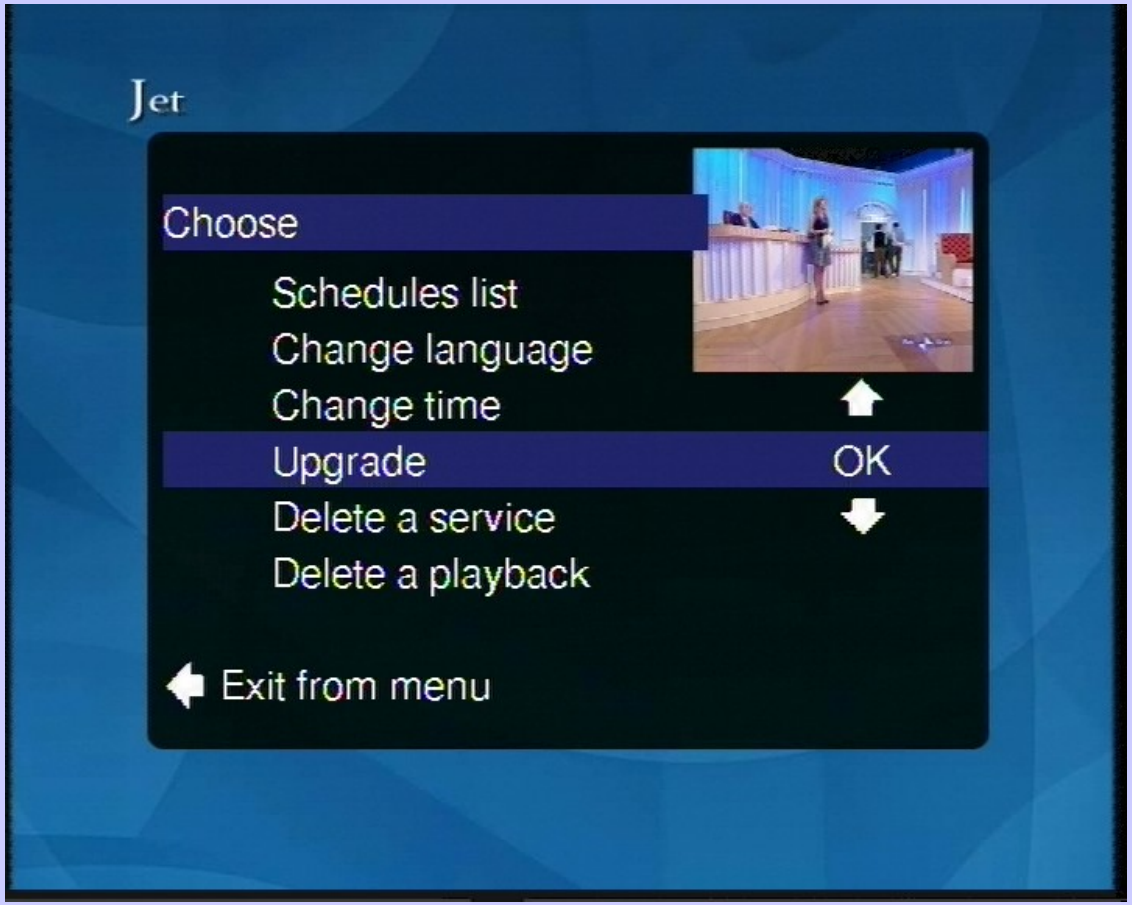
Fancy shot of the GUI

Features

- Flickerfree
- Localizable
- Smooth
- Easy to go
- Different



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The standard feature set

Features:

- EPG guide
- Recording
- Playback
  - Stop and go
  - Fast forward (and back)
  - Timeshift

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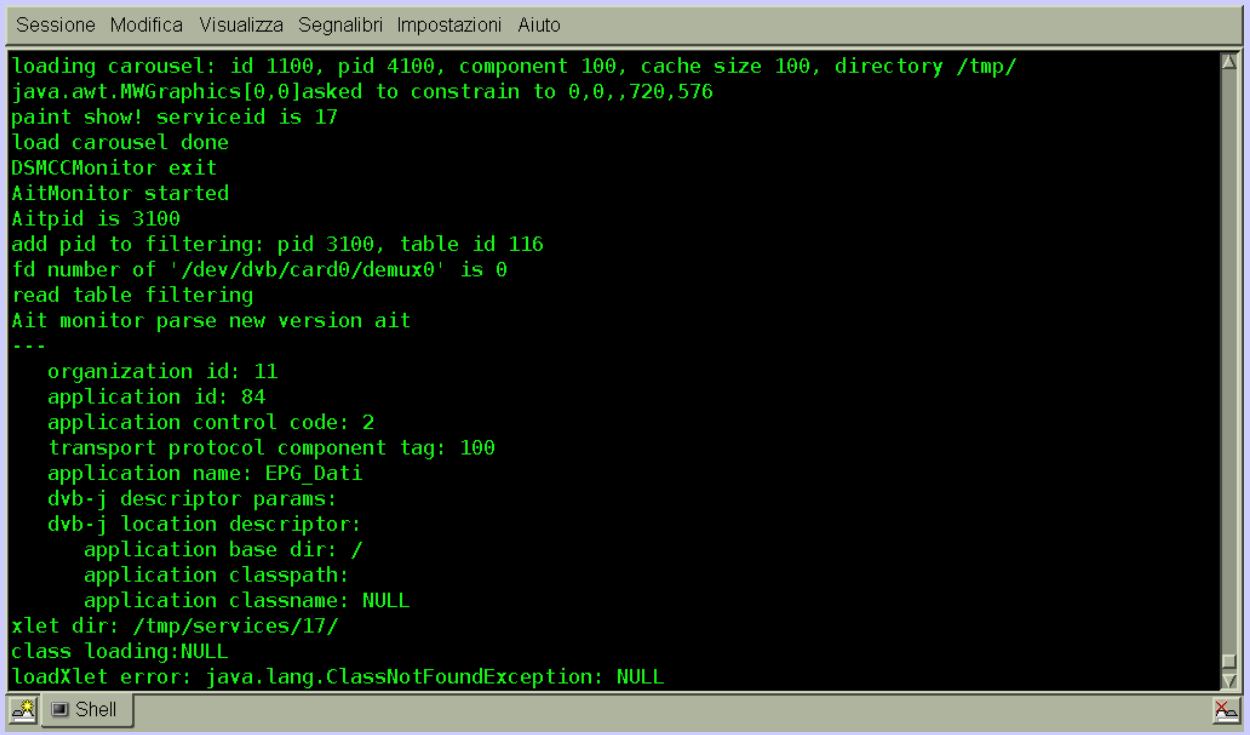
Fancy features of ITV

Interactive television

- DSMCC download
- Xlet execution
- Debugging
- Analysis
- Implementation



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Conclusion

- Digital television is here to stay
- People look for entertainment in a light and smooth packaging
- Actual tech providers are too flashy and cumbersome
- There's room for a change..

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Business on freesoftware?

How are we running this business..

- Consultancy and training
- Integration of products in complex environment
- Mainteinance (assurance!) of software
- Development and customization
- Content and service creation
- Remote management and service center

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Last few words

- This is not rocket science
- Technology isn't everything
- Since the net, people “borrows” everything; get it soon and do the same (legally)
- Flexibility is the key
- Right people do make the difference
- GPL is a snowball, ride it (or learn to keep the breath forever)

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B plan

And always keep in mind the other plan!

- Have fun
- Pump up the volume
- Wait the Big  !! :-)

That's what business @ internet time is all about!

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