Authoring Hypermedia:
It Takes Time!

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- Introduction
  — Overview of hypermedia document model
- Multimedia authoring paradigms
  — Multimedia object description
  — Structure based, timeline-based, flowchart, script
- Views on a hypermedia document
 — Temporal layout, spatial layout, linking
- GRiNS demonstration

So what do we need to specify?

II Spatial layout

III Temporal layout

Top Story:
Growth of the
World-Wide Web

Amsterdam

Los Angeles
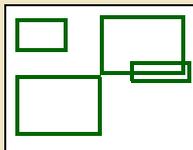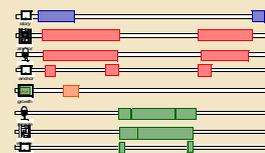
I Content

Top story. Growth of
the World-Wide Web
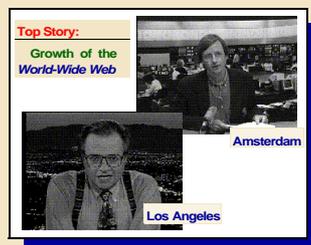
IV Linking

Multimedia object description
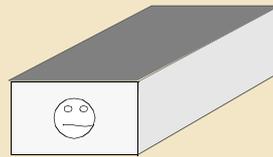
media item

duration (start time, end time)

extent (position on screen)

Multimedia Authoring Paradigms

Structure
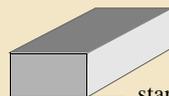
end time

start time

this media item

start time calculated from structure
end time = start + duration, or calculated from structure
position is defined relative to window/screen

Timeline

end time

start time

this media item,
placed by author
on screen

start and end times specified on timeline

Flowchart/script

display media item here
…
erase media item

this media item

start time is implicit time of display command
end time is implicit time of erase command
position is given as part of display command

Structure-based Paradigm

MAD

MET++

Highest level composite object, start time A
(contains two atomic objects and
one composite)

Atomic object, start time A
(shows x and y positions over time)

Atomic object, start time C

Composite object, start time B
(contains two atomic objects)

Atomic object, start time B

Atomic object, start time B

■ ■ TVSynchro 00.10.000
■ ■ TVObject 00.02.000
x
y

■ ■ TVObject 00.02.000
x
y

■ ■ TVSynchro 00.01.567
■ ■ TVObject 00.01.567
x
y

■ ■ TVObject 00.01.567
x
y

Time

A   B   C

Mbuild

TBbox-02

SEbox-02

TBbox-01

SEbox-01

Sound-01   Garden-01   Tglue-02   Members-01   Venice-01   Tglue-01   Paris-01

TBbox-02

Tglue-02   Tglue-01   SEbox-01

SEbox-02

Garden-01   Venice-01   Paris-01

Member-01

TBbox-02   Sound-01
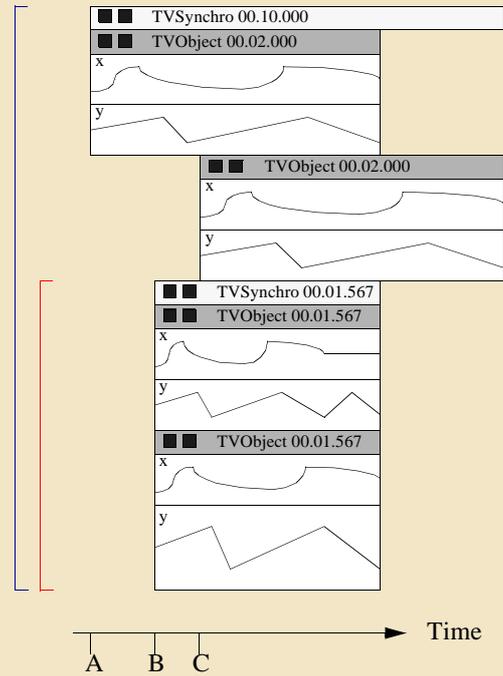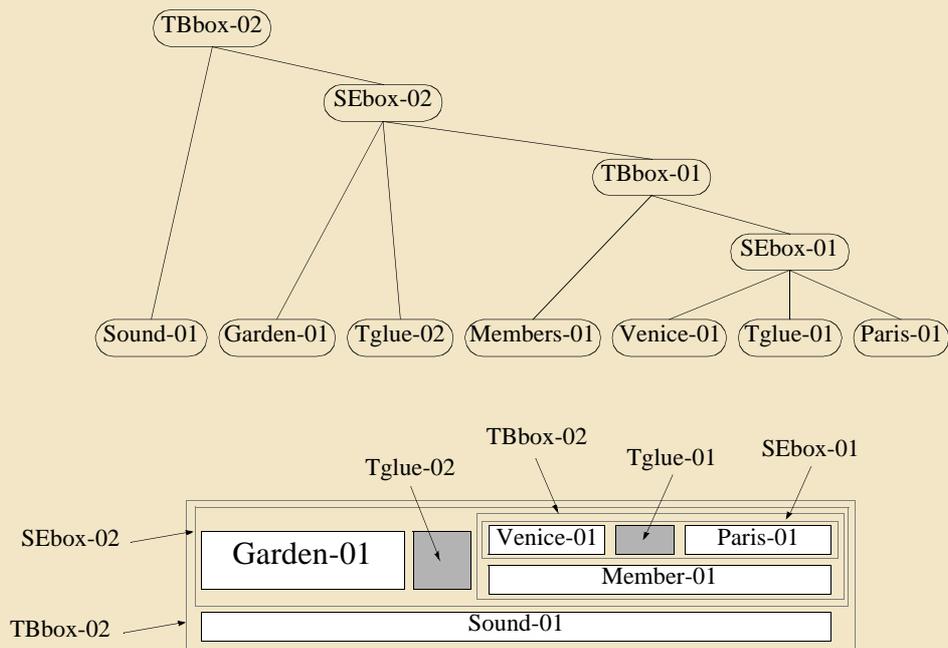
Summary — structure based

Explicit visualization and manipulation of presentation's structure
- structure can be viewed at different levels of detail
- structure can be used to derive (global) timing of presentation.

Synchronization constraints can be specified
- between media item and a scene, or between scenes
- need timeline to show result of constraint.

Difficult to get feel for layout over time

Links can be created among structures

Initial authoring effort is greater

Timeline-based Paradigm
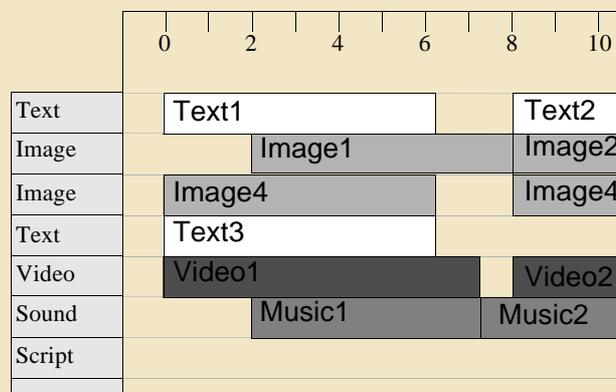
Director
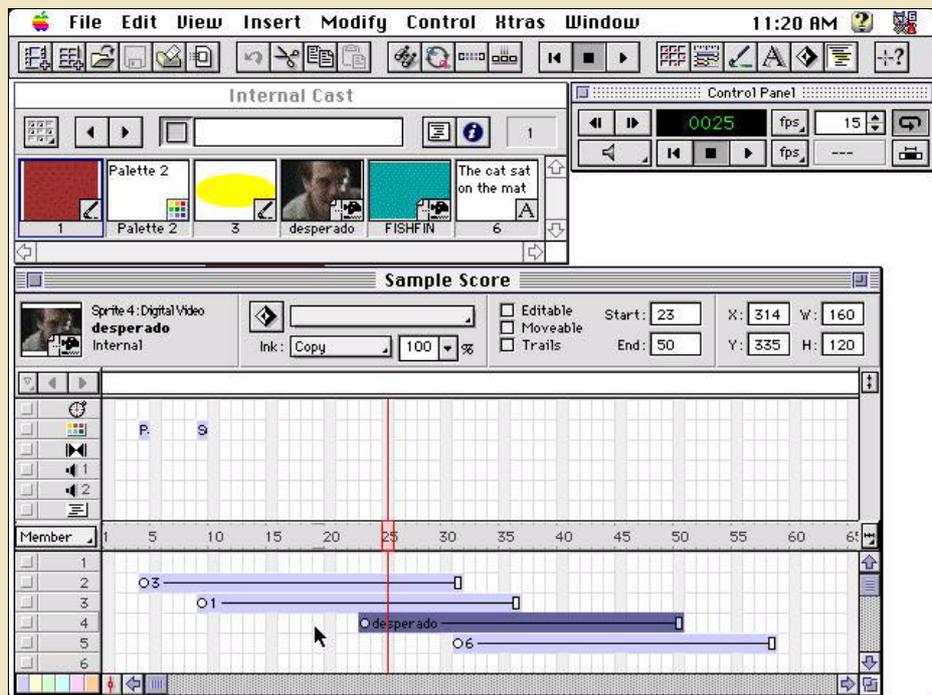
Integrator

Presentation represented as set of tracks

Timing within a track is determined by position along the track

Synchronization of items across tracks determined by vertical relationships

Input, control and tempo tracks are also included

Composition is also possible
- composite placed on control track of timeline
- internal structure of composite can be inspected
- cannot create synchronization to/from within composite

Flow operations allow iteration and branching constructs
- make visualization on timeline difficult to interpret

Transitions can be specified
- associated with beginning or end of media items, also joining two

Summary — timeline

Time axis is main method of organising temporal positioning
- line with marked off intervals
- start times and durations shown explicitly, and also directly manipulable

Time axis can also be used to show values of properties over time (MET^{++})

Synchronization constraints can be visualized and are editable
- but not with respect to a scene

Difficult to get feel for layout over time
- but can specify point on timeline to look at layout

Links often created via scripts, and may include transition

**Scene breaks not explicit, and difficult to navigate long presentation**

Flowchart Paradigm

Introduction

?

Play sound1

Place pic1
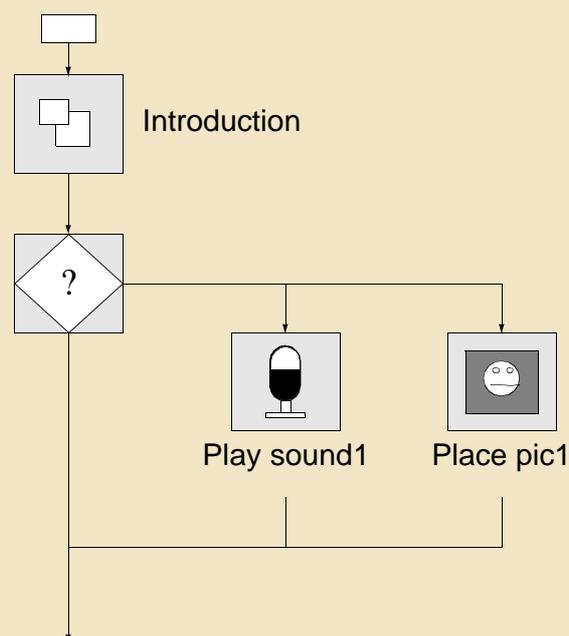
Authorware
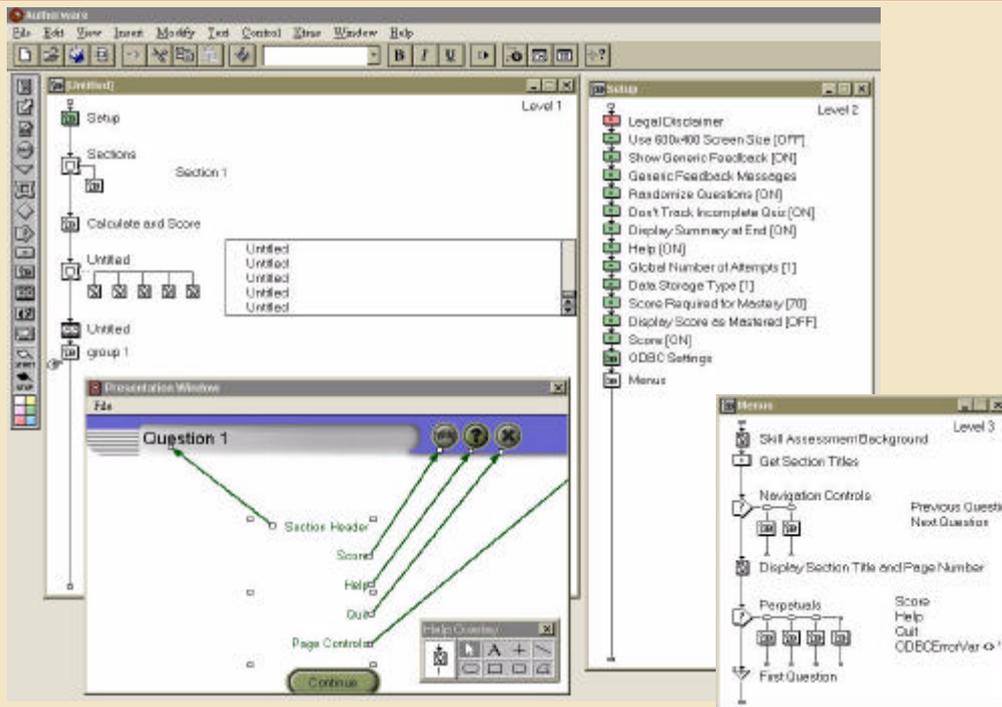
IconAuthor

Icon-based, with flowcharts constructed from library of icons

No enforcement of programming discipline

Flowchart can be zoomed in and out
- collections of icons can be collapsed and expanded

Presentation can be previewed from a selected starting point

Eventor

Three different views of presentation
- temporal synchronizer
- spatial synchronizer
- user interaction builder

Combine timeline and flowchart (event-based) paradigms

Provide automatic aids for validating, e.g. temporal constraints

Temporal constraints can be specified among media items and composites

Paths and scaling transformations can be specified by demonstration
- less well visualized than in MET[++]

Summary — Flowchart

Events are specified in turn

Allows more powerful interaction commands
- for example, multiple choice questions

A number of events can be grouped
- narrative structure *can* be represented, but there is no guarantee

When previewing presentation, current state not necessarily known

Timing specification via "display item" and "remove item"
- simultaneous display can only be approximated
- synchronization relations cannot be specified
- unclear from script which objects are currently playing
- spatial relations are also unclear

Links are specified via commands

Script-based Paradigm

```
set win=main_win
set cursor=wait
clear win
put background "pastel.pic"
put text "heading1.txt" at 10,0
put picture "gables.pic" at 20,0
put picture "logo.pic" at 40, 10
put text "contents.txt" at 20,10
set cursor=active
```

Videobook

Media items and hotspots specified via a script
- include temporal and spatial information
- timing information is with respect to the beginning of a scene

Three-dimensional display is generated

Scenes can be nested
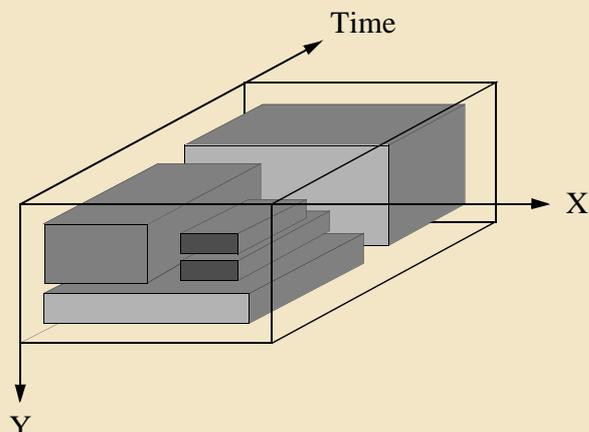
Harmony

Links are used for expressing timing between nodes

Scenario viewer displays derived structure of a scenario

```
Start → Text greeting → Video :1
                      → Music inv.05 → Picture :1
                                     → Video :5
                                     → Text Thanks
```
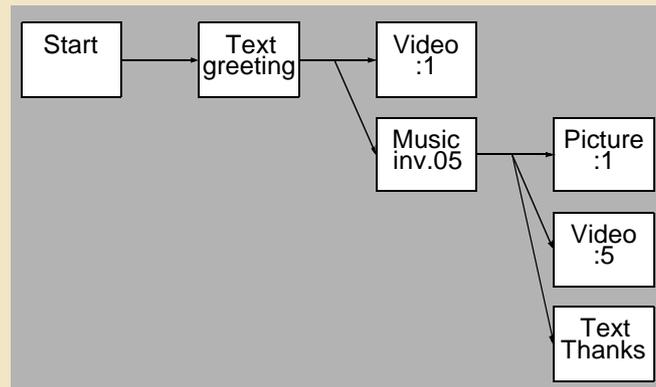
Command streams

Presentation is sequence of (possibly synchronized) command streams

Each stream is an ordered collection of commands
- each with its own execution time

There is sufficient information to play these streams forward or backwards

Authors noted that grouping was missing in their initial implementation

Summary — script

Similar to flowchart based systems, but direct access to scripts

Lack tools for viewing procedure calls in structured way

Narrative structure can be reflected in script, but need not be

Structure, spatial and timing information is in script, so visualizations can be generated

Specfying Links

Structure-based
- source component and anchor, along with context, can be specified
- destination information can also be specified
- transition information can be recorded

Timeline paradigm
- source and destination contexts restricted to points on timeline
- transition can be specified (via script)

Flowchart/script paradigms
- source anchor is hotspot with script
- script specifies source context implicitly by erasing (some) playing objects
- transition can also be specified
- destination context implicit through items which are displayed

Properties of Authoring Paradigms

Structure-based systems
- good for viewing, editing and navigating narrative structure
- less good for viewing timing
- layout information specified per object
- interaction restricted to specifying and following links
  — links can be fully specified

Timeline-based systems
- best way of visualizing timing of presentation
- not necessarily best way of editing timing
- layout specified per object per time
- links are jumps to other part of timeline

Flowchart/script-based systems
- narrative *can* be reflected in procedure structure
- timing and layout specified per object
- interaction flexibility is high

Views on a hypermedia document

WYSIWYG doesn't work for hypermedia — the document is too complex.

Instead, an environment can provide different views of the document:
- temporal layout
- spatial layout
- linking
- previewing

Temporal layout (144-150)

Duration, start time (can be derived from structure)

Tempo

Applying temporal transformations
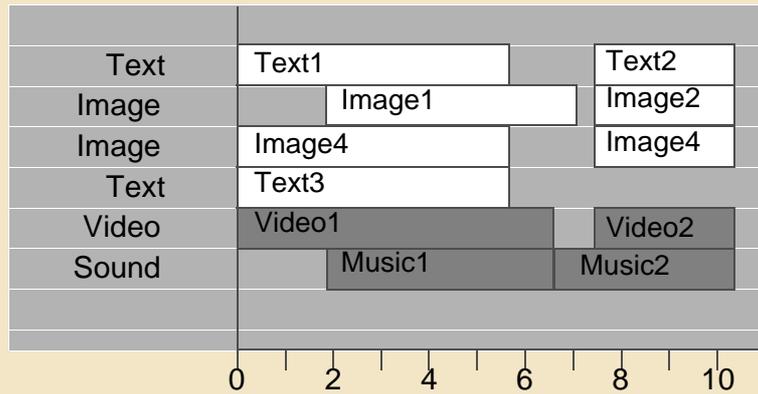
Temporal constraints
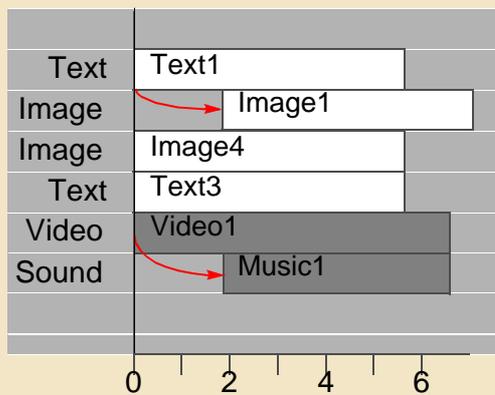
Constraints between events
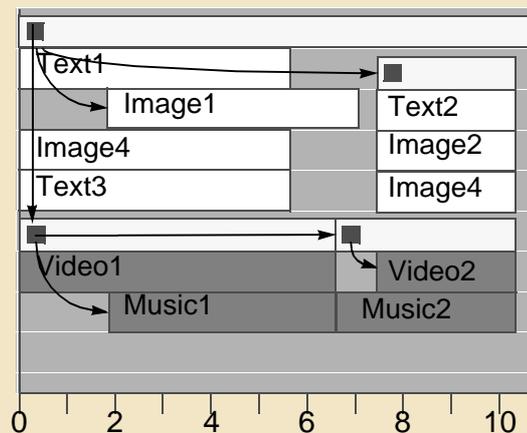
Constraints from and between structures

Navigating the timeline

Standard way is scrolling — see Director, slide 11

Text	Text2
Image	Image2
Image	Image4
Text	
Video	Video2
Sound	Music2

6   7   8

Timeline zoomed in (4x)

Text1	Text2
Image1	Image2
Image4	Image4
Text3	
Video1	Video2
Music1	Music2

0   2   4   6   8   10

Fisheye view
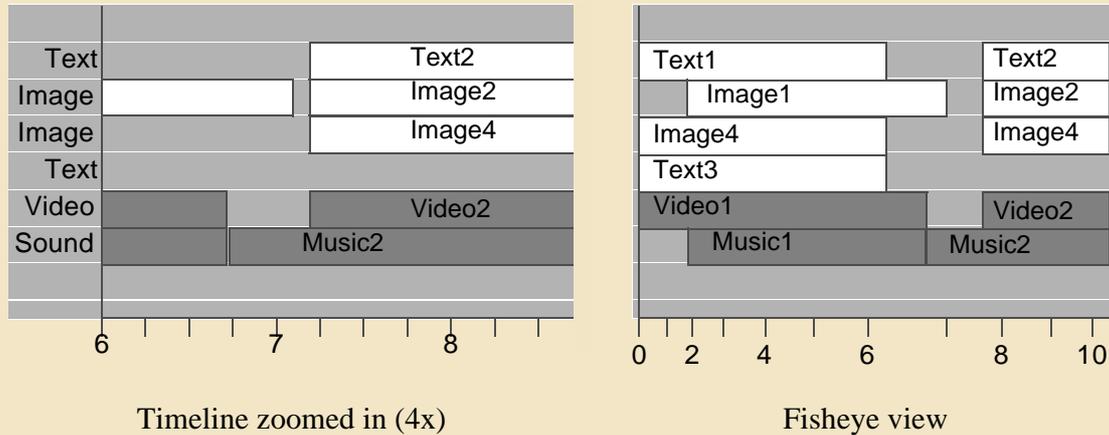
Spatial Layout (150-155)

Size, position of object

Position of transition

Regions

Spatial layout (2D) cannot be derived from structure

Applying spatial transformations

Spatial layout navigation

Possible ways to specify layout

w.r.t. x,y axes

w.r.t. item

function of time

regions

Spatial Layout

Heading

Hthjk shkjh jk
skjhf k;s k; hf
kaoi j gk;sj id;
oi ; a;oij ajkk t
uiopth dbvnk
nxmkcvn xmc
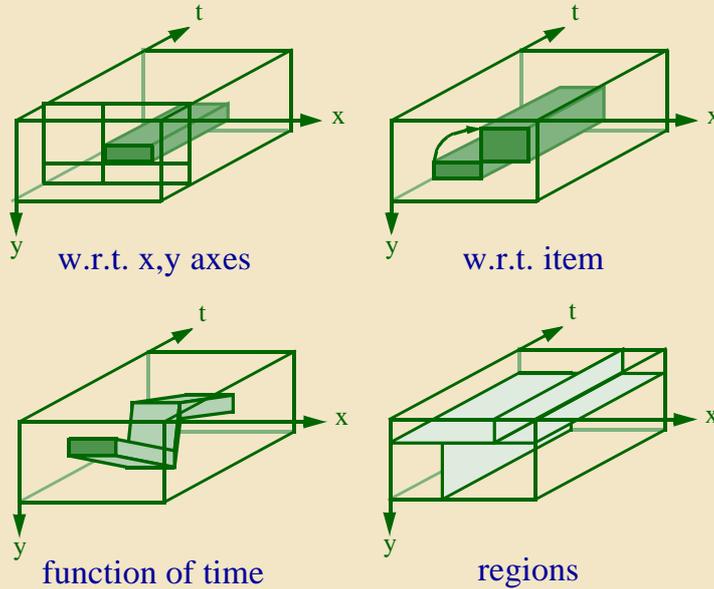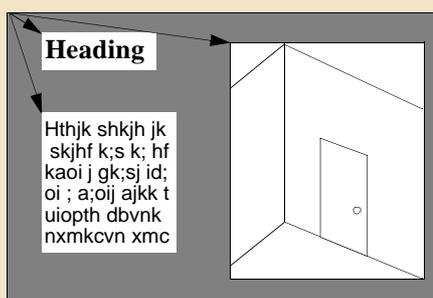
Position with respect to window

Heading

Hthjk shkjh jk
skjhf k;s k; hf
kaoi j gk;sj id;
oi ; a;oij ajkk t
uiopth dbvnk
nxmkcvn xmc
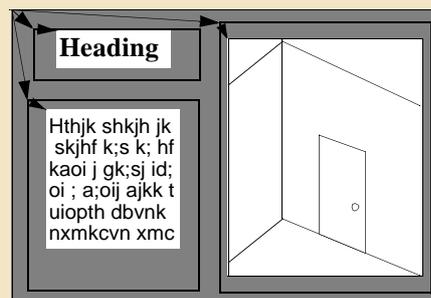
Position with respect to region

x

y

0   2   4   6   8   10
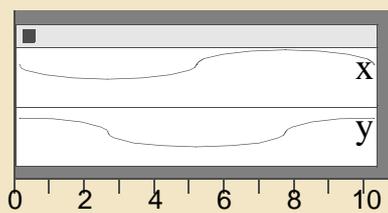
Position changing with time

Linking

Create links (see following slides)

- source anchor and context, transition, destination anchor and context

Find incomplete links

Check complete links

Find unlinked items

Link from element to presentation
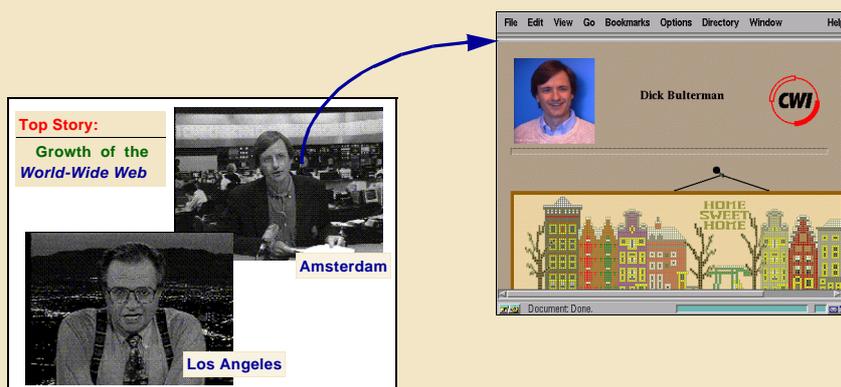
- Source may also pause while destination is shown,
- or destination may replace the source.

Link from element to element
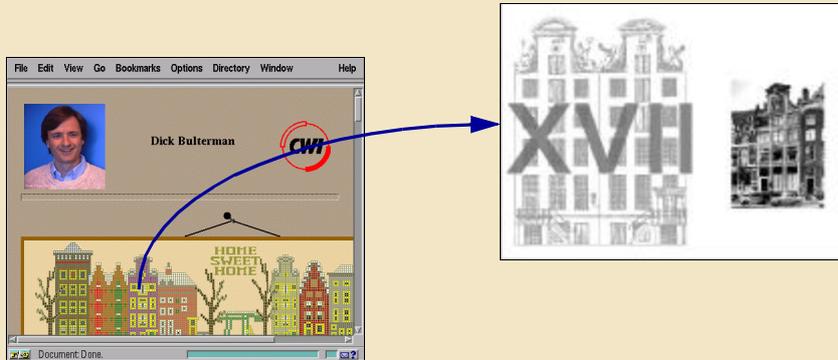
Link from anchor to anchor
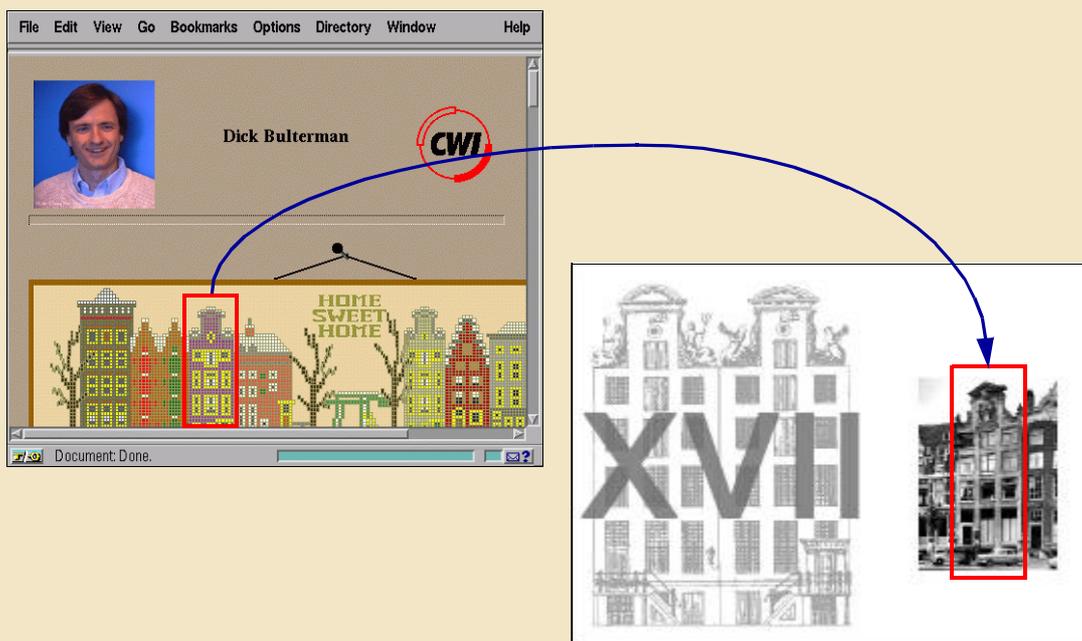
Authoring using GR*i*NS

Media items

Hierarchy view

Scene information

Timeline view

Creating a synchronization arc

Layout view

Link view

Media object nodes
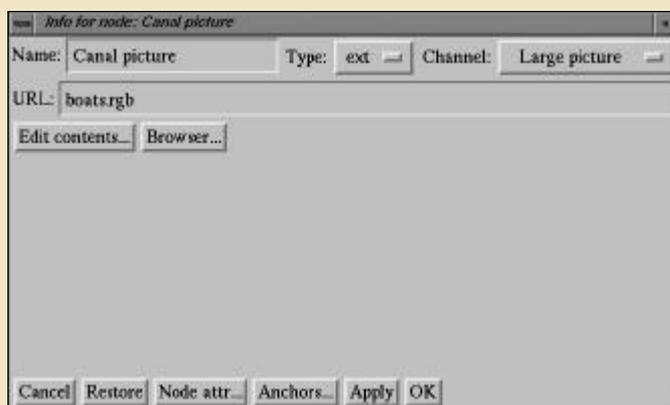
Node information

Node attributes

Hierarchy View
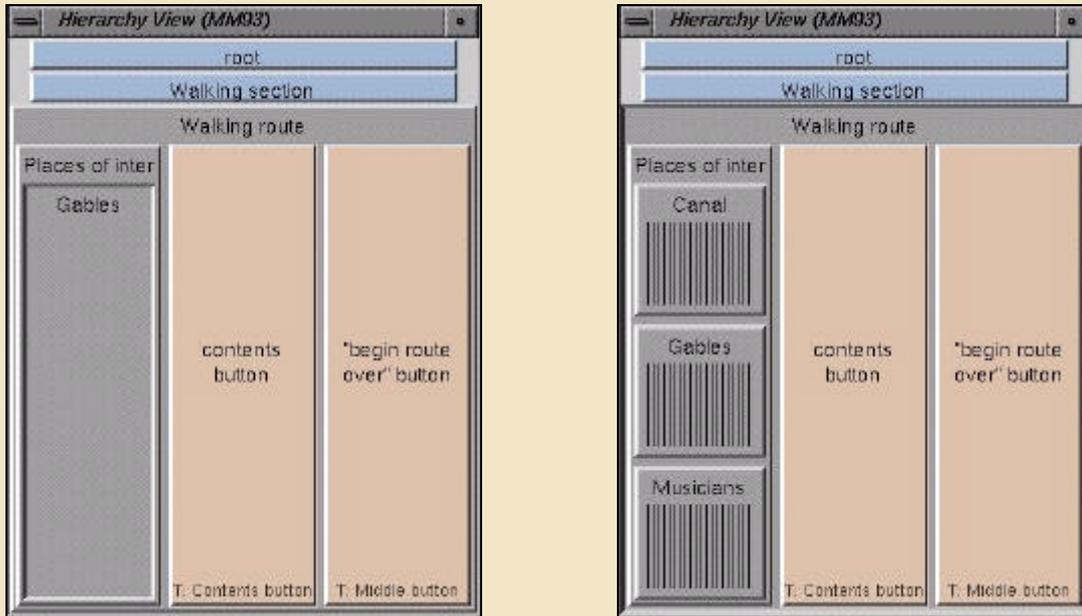
Scene information
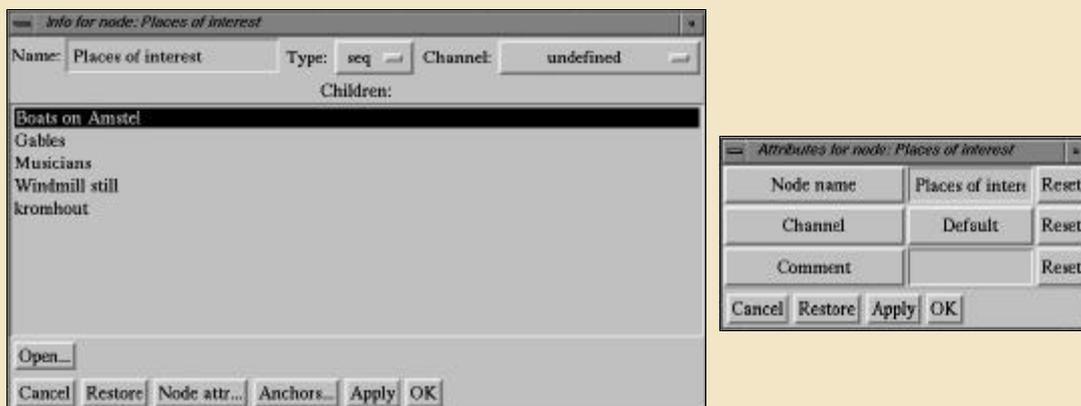
Timeline view
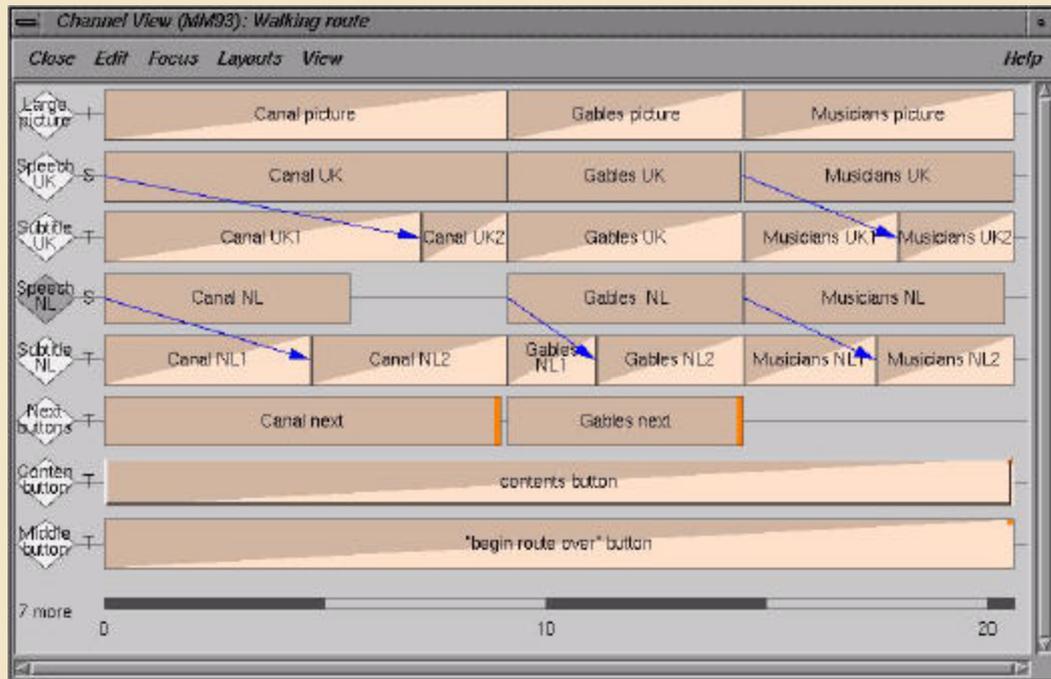
Creating a synchronization arc
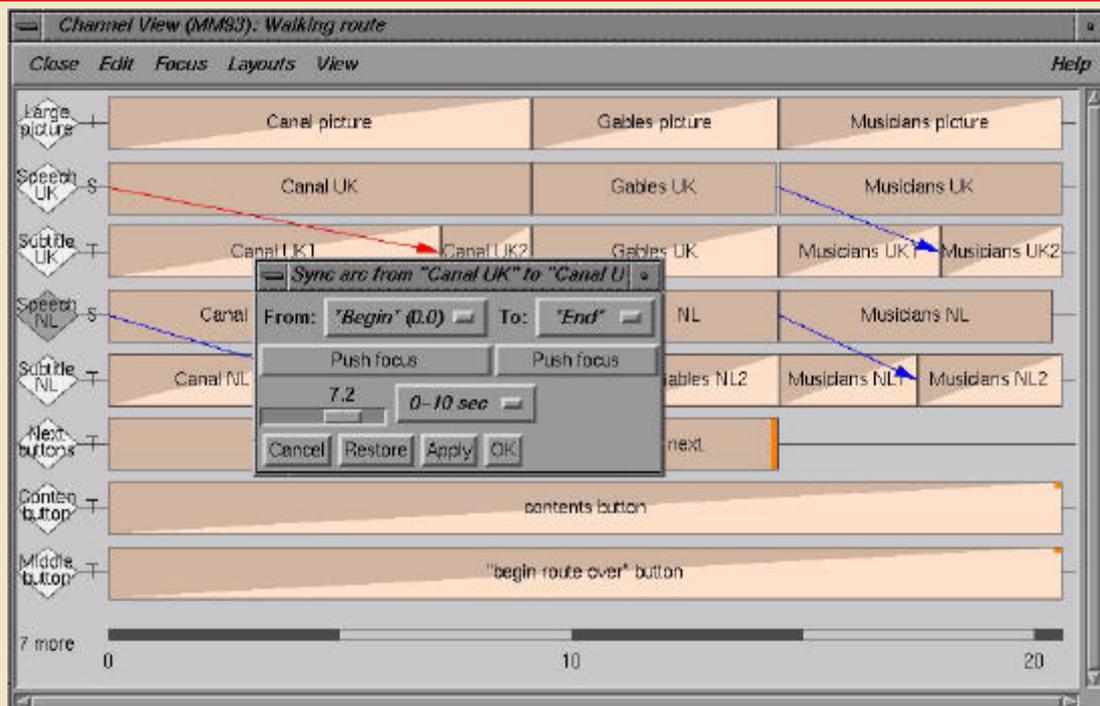
Layout view
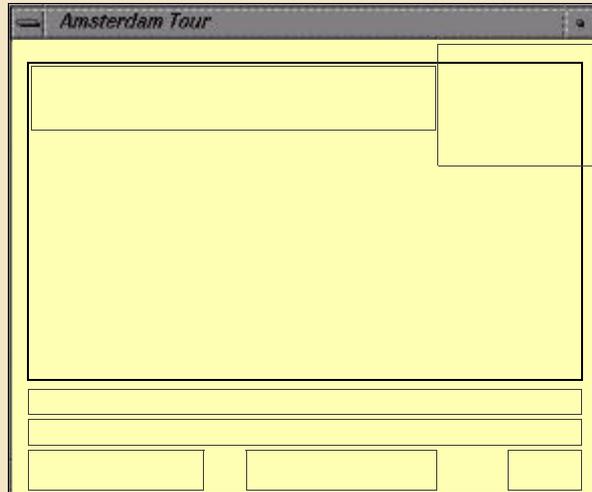
Link View

Further information

http://www.cwi.nl/~lynda/thesis

http://www.cwi.nl/GRiNS

http://www.cwi.nl/SMIL
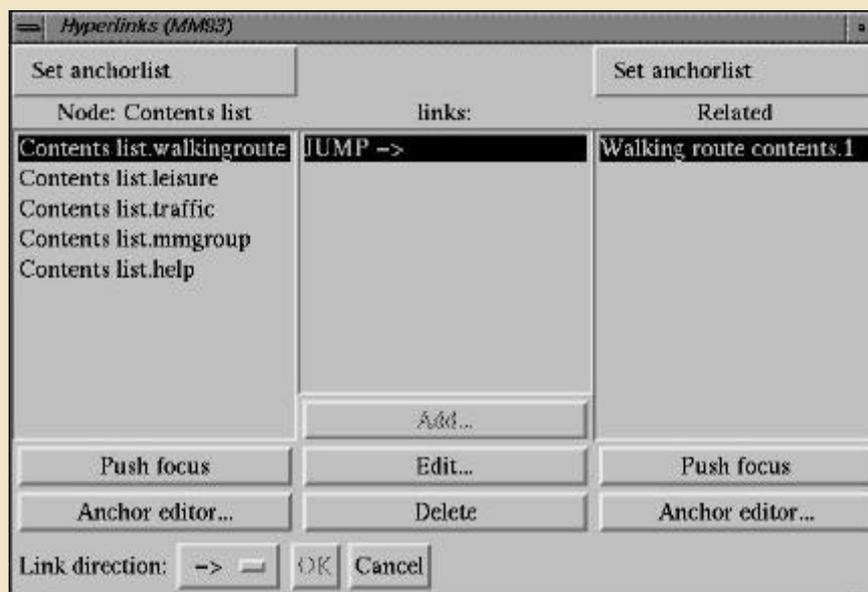
Proceedings of ACM Multimedia

Proceedings of Multimedia Modeling