



Welcome to Fundamentals of Multimedia (MR412)

Fall, 2013

Lecture 1

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Chapter 1

Introduction to Multimedia

- 1.1 What is Multimedia?
 - 1.2 History of Multimedia, Then Hypermedia
 - 1.3 World Wide Web
 - 1.4 Overview of Multimedia Software Tools
 - 1.5 Research Projects
 - 1.6 Further Exploration
-

Announcement on teaching staff



Instructor: ZHU Yongxin, Winson

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TA: Wu Yafei

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- Location: Lab 209

Announcement on Courseware



Website to download courseware:

- <http://ic.sjtu.edu.cn/ic/mm/>



Time & Venue:

- Monday 14:00 – 15:40, 东下院100
 - Thursday: 14:00 – 15:40 , 东下院400
-

Announcement on Homework


 How to submit your homework?

Email to: multimedia.hw2013@gmail.com

Naming conventions:

 studentno_name_lab_no.pdf

 studentno_name_homework_no.pdf

 (eg: 1062110xxx_zhangsan_lab_1.pdf

/1062110xxx_zhangsan_homework_1_15.pdf)

Announcement on Text Book



《Fundamentals of Multimedia》 ,
Ze-Nian Li, Mark S. Drew, Pearson
Education Asia Ltd. 原版, 机械工业
出版社影印版, 2004年



多媒体技术教程（中译版），马华东 等译，机械
工业出版社，2007

Syllabus

The screenshot shows a web browser window with the URL <http://electsys.sjtu.edu.cn> and a tab titled "MainPlat". The page header includes the university logo and the text "上海交通大学 教学信息服务网". A navigation bar contains "返回首页" and "注销本次登录".

On the left is a sidebar menu with the following items:

- 祝永新的工作平台
- 教学参考书管理
- 教学计划
- 教学进度**
- 课程表
- 考试安排
- 成绩管理
- 评教管理
- PRP
- 个人设定

The main content area is titled "教学进度明细设置" and contains a table with the following data:

起始周	结束周	内容及学时(讲课、习题、课堂讨论、实验实习等形式)	作业
9	9	Chapter 1, Chapter 2	
10	10	Chapter 3, Chapter 4	Chapter 3
11	11	Chapter 5, Chapter 6, Lab1	LAB1
12	12	Chapter 7	Chapter 7
13	13	Chapter 9	Chapter 9
14	14	Chapter 10, Chapter 11	Chapter 10
15	15	Chapter 12, Chapter 18	Chapter 12
16	16	Review	

Below the table is a section titled "进度表信息的添加、删除" with a form for adding new entries:

起始周:(请添入数字)	<input type="text"/>	作业:	
结束周:(请添入数字)	<input type="text"/>	学习工作内容:(讲课、习题、课堂讨论、实验实习等形式)	

At the bottom of the page, there are buttons for "新增" (Add) and "返回" (Back).

Homework & Grading Policy



Homework

- There will be around 4 sets of Homework
- Homework will be due at the beginning of the following class
- Late Homework will have 10% deduction for each late day
- It is your responsibility to locate the TA to hand-in late Homework
- No credit for late Homework handed-in after grading



Lab/Projects

- Individual report is required for at least 2 labs,
- Additional projects (small but complete) will be announced for individual or small groups (no more than 3 persons)



Grading

- 30-50% final exam in Jan. 2014
 - Project review OR closed form exam
- 30% homework
- 20-40% lab/projects

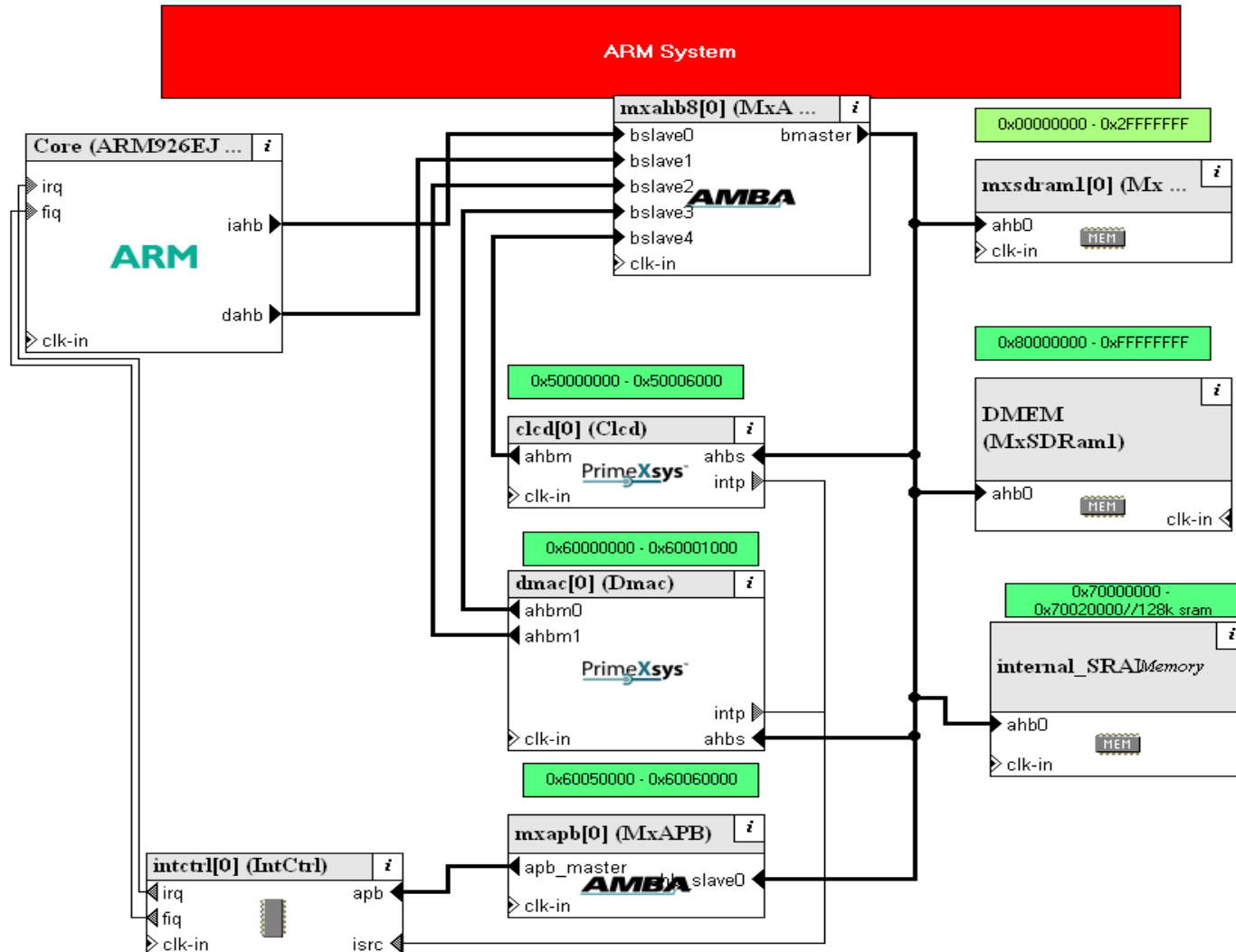
Others



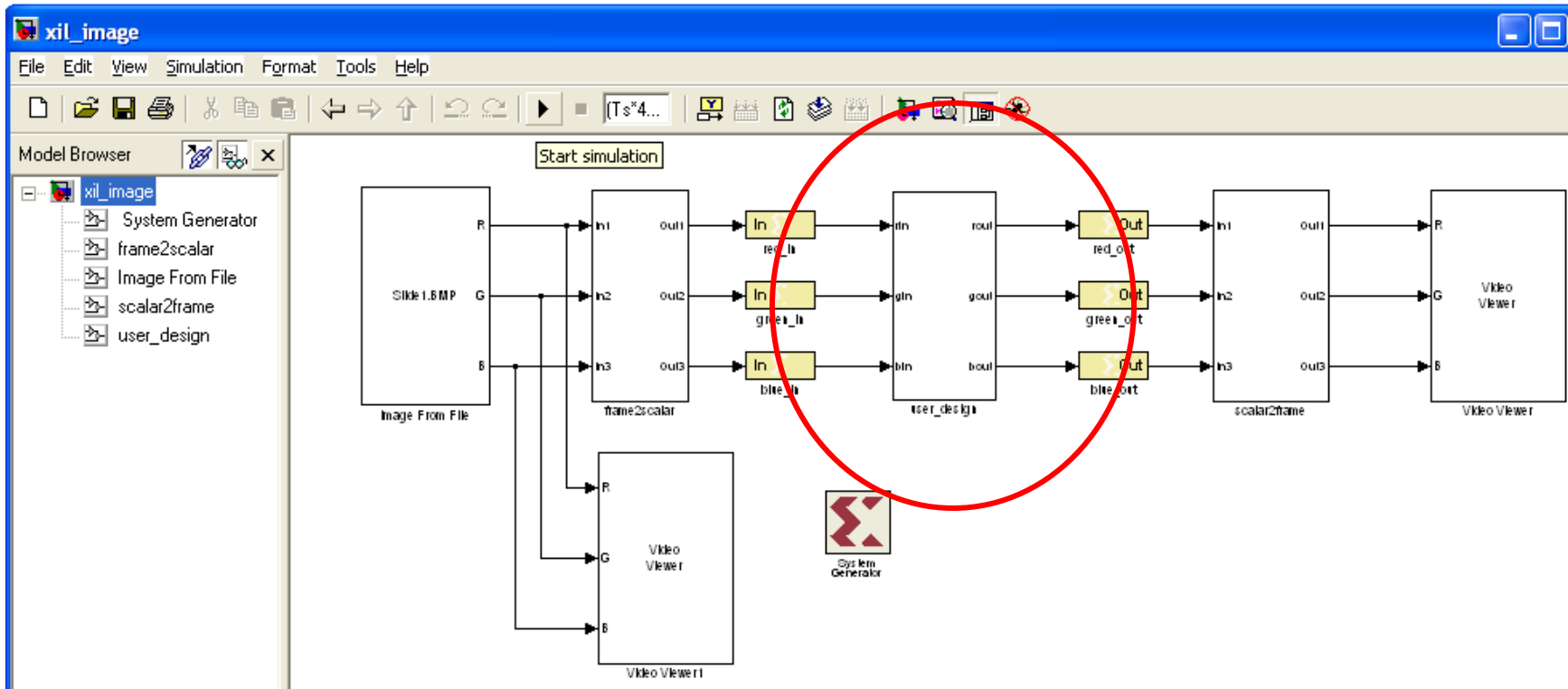
Projects

- Designing algorithms based on Matlab/Java/C/Simulink
 - Design a small but complete system using FPGA
-

Experiment Tools: ARM ESL Platform- SoC Designer



Experimental Tools: Simulink + SysGen



Chapter 1

Introduction to Multimedia

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 - 1.2 History of Multimedia, Then Hypermedia
 - 1.3 Overview of Multimedia Software Tools
 - 1.4 Research Projects
 - 1.5 Further Exploration
-

1.1 What is Multimedia?

- When different people mention the term **multimedia**, they often have quite different, or even opposing, viewpoints.
 - A consumer entertainment vendor: interactive cable TV with hundreds of digital channels available, or a cable TV-like service delivered over a high-speed Internet connection.
 - A Computer Science (CS) student: applications that use multiple modalities, including text, images, drawings (graphics), animation, video, sound including speech, and **interactivity**.
- **Multimedia, Microelectronics and Computer Science:**
 - Multimedia signal processing, video codec, audio codec, multimedia SoC, embedded systems
 - Graphics, HCI, visualization, computer vision, data compression, graph theory, networking, database systems.

IEEE Multimedia's Definition



Focus on multimedia computing and communications systems. It covers such topics as hardware and software for media compression, media storage and transport, workstation support, data modeling, and abstractions to embed multimedia in applications programs.

Components of Multimedia

- Multimedia involves multiple modalities of text, audio, images, drawing, animation, and video. Examples of how these modalities are put to use:
 - 1. SKYPE: Video teleconferencing
 - 2. <AVATAR>: “Augmented” reality: placing real-appearing computer graphics and video objects into scenes.
 - 3. OPEN UNIVERSITY: Distributed lectures for higher education.
 - 4. Youtube/Facebook: Searching in (very) large video and image databases for target visual objects.
 - 5. Remote Surgery: Tele-medicine.
 - 6. Virtual Lab: Co-operative work environments.
-

Components of Multimedia (cont'd)

- 7. Including audio cues for where video-conference participants are located.
 - 8. Building searchable features into new video, and enabling very high- to very low-bit-rate use of new, scalable multimedia products.
 - 9. Making multimedia components *editable*.
 - 10. Building “inverse-Hollywood” applications that can recreate the process by which a video was made.
 - 11. Using voice-recognition to build an interactive environment, say a kitchen-wall web browser.
-

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1.2 History of Multimedia, Then Hypermedia

- History of Multimedia:
 - 1. **Newspaper**: perhaps the *first* mass communication medium, uses text, graphics, and images.
 - 2. **Motion pictures**: conceived of in 1830's in order to observe motion too rapid for perception by the human eye.
 - 3. **Wireless radio transmission**: Guglielmo Marconi, at Pontecchio, Italy, in 1895.
 - 4. **Television**: the new medium for the 20th century, established video as a commonly available medium and has since changed the world of mass communications.
 - 5. The **connection** between **computers** and ideas about **multimedia** covers what is actually only a short period:
-

History of Multimedia (cont'd)

- 1945 - Vannevar Bush wrote a landmark article describing what amounts to a hypermedia system called **Memex**.
 - 1960 - Ted Nelson coined the term **hypertext**.
 - 1967 - Nicholas Negroponte formed the **Architecture Machine Group**.
 - 1968 - Douglas Engelbart demonstrated the **On-Line System (NLS)**, another very early hypertext program.
 - 1969 - Nelson and van Dam at Brown University created an early hyper text editor called **FRESS**.
 - 1976 - The MIT Architecture Machine Group proposed a project entitled **Multiple Media** - resulted in the *Aspen Movie Map*, the first hypermedia videodisk, in 1978.
-

History of Multimedia (cont'd)

- 1985 - Negroponte and Wiesner co-founded the **MIT Media Lab**.
 - 1989 - Tim Berners-Lee proposed the **World Wide Web**
 - 1990 - Kristina Hooper Woolsey headed the **Apple Multimedia Lab**.
 - 1991 - **MPEG-1** was approved as an international standard for digital video - led to the newer standards, **MPEG-2**, **MPEG-4**, and further **MPEGs** in the 1990s.
 - 1991 - The introduction of **PDAs** in 1991 began a new period in the use of computers in multimedia.
 - 1992 - **JPEG** was accepted as the international standard for digital image compression | led to the new JPEG2000 standard.
 - 1992 - The first **MBone** audio multicast on the Net was made.
 - 1993 - The University of Illinois National Center for Supercomputing Applications produced **NCSA Mosaic** - the first full-fledged browser.
-

History of Multimedia (cont'd)

- 1994 - Jim Clark and Marc Andreessen created the **Netscape** program.
 - 1995 - The **JAVA** language was created for platform-independent application development.
 - 1996 - **DVD video** was introduced; high quality full-length movies were distributed on a single disk.
 - 1998 - **XML 1.0** was announced as a W3C Recommendation.
 - 1998 - **Hand-held MP3 devices** first made inroads into consumerist tastes in the fall of 1998, with the introduction of devices holding 32MB of flash memory.
 - 2000 - WWW size was estimated at over **1 billion pages**.
-

Hypermedia and Multimedia

- A **hypertext** system: meant to be read nonlinearly, by following links that point to other parts of the document, or to other documents (Fig. 1.1)
- **HyperMedia**: not constrained to be text-based, can include other media, e.g., graphics, images, and especially the continuous media - sound and video.
 - The World Wide Web (WWW) - the best example of a hypermedia application.
- **Multimedia** means that computer information can be represented through audio, graphics, images, video, and animation in addition to traditional media.

Example of Hypertext

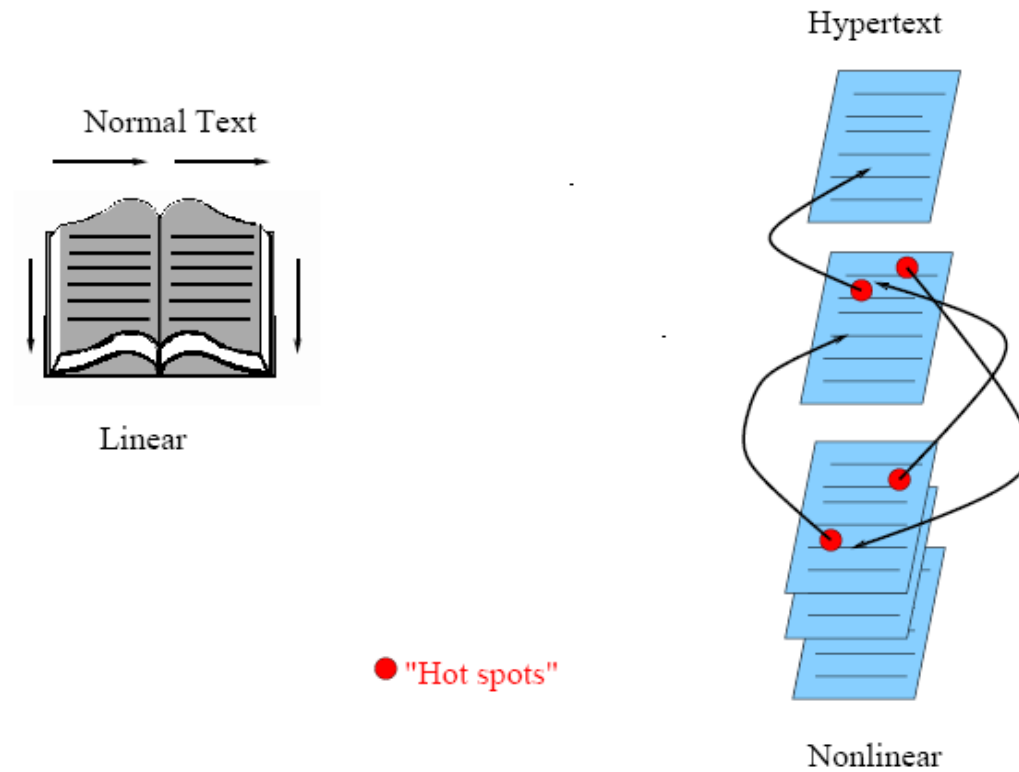


Fig 1.1: Hypertext is nonlinear

Present multimedia applications

- Examples of typical present multimedia applications include:
 - Digital video editing and production systems.
 - Electronic newspapers/magazines.
 - World Wide Web.
 - On-line reference works: e.g. encyclopedias, games, etc.
 - Home shopping.
 - Interactive TV.
 - Multimedia courseware.
 - Video conferencing.
 - Video-on-demand.
 - Interactive movies.

百度一下 帮助 | 高级搜索

- 美女明星
- 新鲜资讯
- 音乐MV
- 热门电影
- 电视剧场
- 卡通动漫
- 游戏天地
- 体育世界
- 自拍搞笑
- 综艺节目
- 相声小品
- 独播剧场

- 天线 首页 | 资讯 | 娱乐 | 体育 | 奥运 | 财经 | 时尚 | 生活 | 影视

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搜索视频

高级
已启用高级安全搜索

- 热门视频
- 最新视频
- 高清电影
- 高清连续剧
- 名人明星
- 搞笑自拍
- 音乐
- 体育
- 动漫游戏
- 电视栏目

- 优酷
- 土豆网
- 新浪
- 酷6网
- 激动网
- 六间房
- 搜狐
- 56网
- 爆米花
- 上海文广
- 凤凰网
- 天线
- 琥珀网
- 夸克
- 时光网
- 第一视频
- 央视

电视剧新版《红楼梦》首播庆典



天线视频 1:39:01 - 5天前

新版电视剧《红楼梦》首播庆典28日晚在北京温都水城举行。走上庆典红毯的除新版《红楼梦》主创人员李少红、李...

精选栏目：高清电影



- 知法犯法
- 激动网 1:26:00 - 2年前
- 知法犯法
- 爱情呼叫转移2
- 新浪视频 1:47:00 - 9个月前

上升最快搜索

- 那些迷人的往事
- 火影忍者387
- 新包青天
- 袖枪手
- 迷恋1020



新酷6首页

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微博有鬼II 魔道六宗 星辰变 客车追尾 钓鱼岛争端 百度360大战 星声报到 发现星主播 3D体验 明星视频日记 中新网专区



云南彝良连环地震千人伤亡 直击救援现场

云南1小时内发生5.7级和5.6级地震，千人受伤。受灾人口超过70万。温家宝昨晚乘飞机赶赴灾区。[视频详情](#)>>[评论](#)>>

播放: 25267 评论: 3



专题 周克华毙命处景点 竟有解说员

评论: 31



独家 上海小学一年级学生用iPad上课

播放: 19287 评论: 8



奥巴马未来施政主张两次提中国

播放: 17022 评论: 5



实拍小男孩对女贼一通暴打

播放: 45747 评论: 5

登录新酷6享受专属特权 体验零等待播放的痛快

精选视频

娱乐精选



宋轶-曝荧幕初吻
胡灵-泡澡遭突袭
张定涵-感动泪洒
曲婉婷-一夜爆红

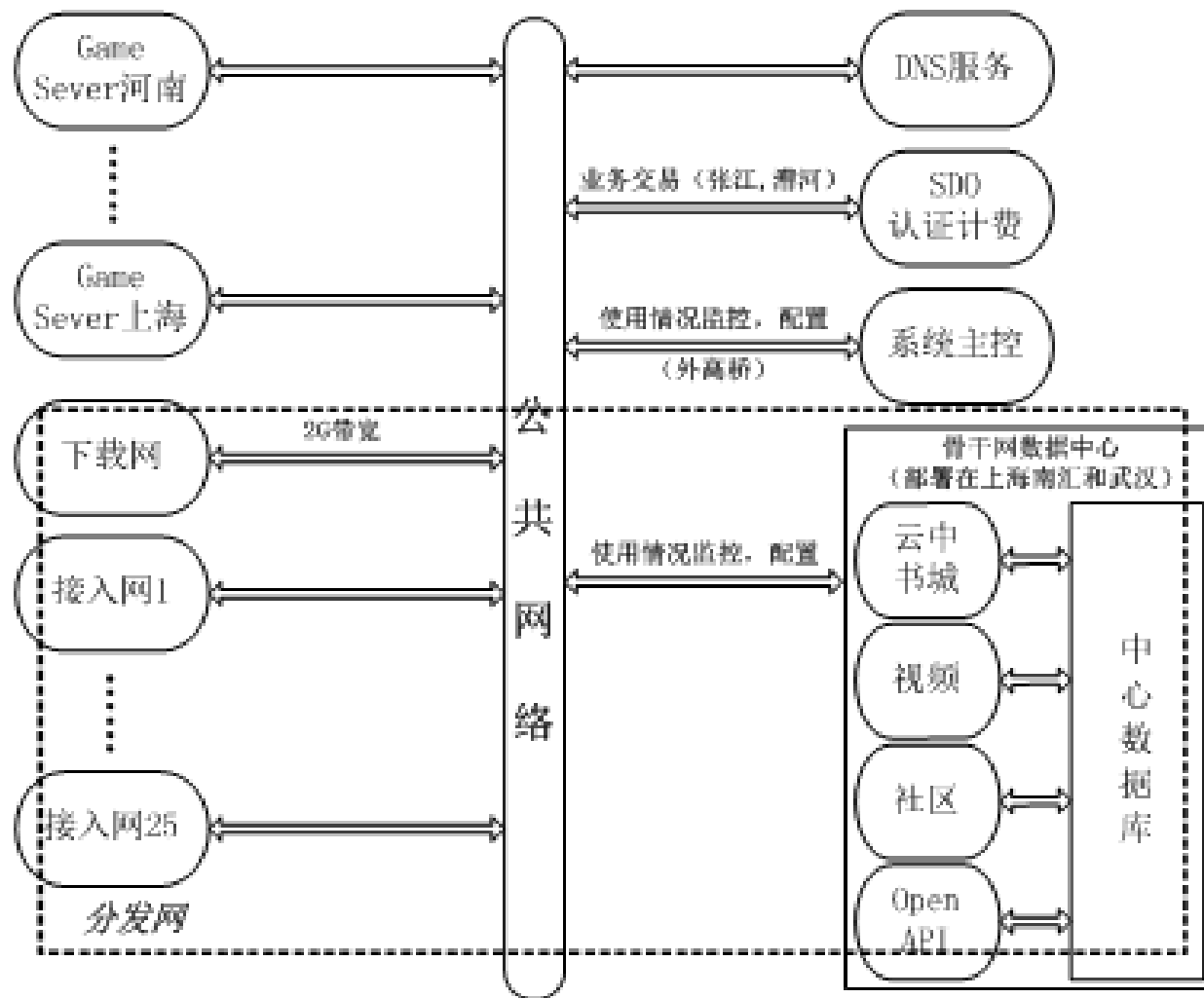
资讯精选



哈公布断桥施工单位
日驻华大使汽车被截
女子向日本使馆扔瓶
武汉村民领百克金条

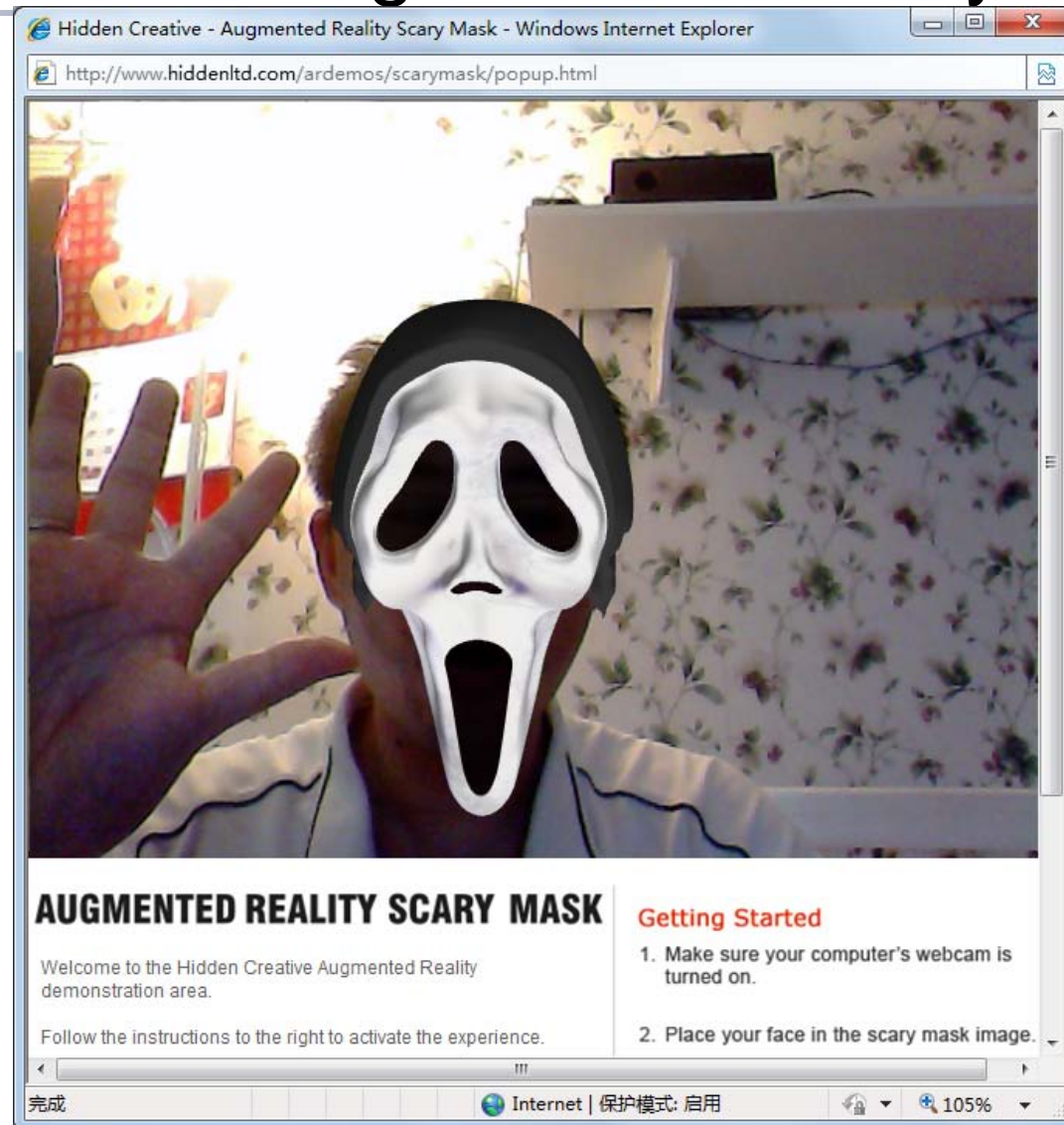
标签精选

Multimedia Service in Cloud Computing



“Augmented” Reality

I put on a scary mask last year:



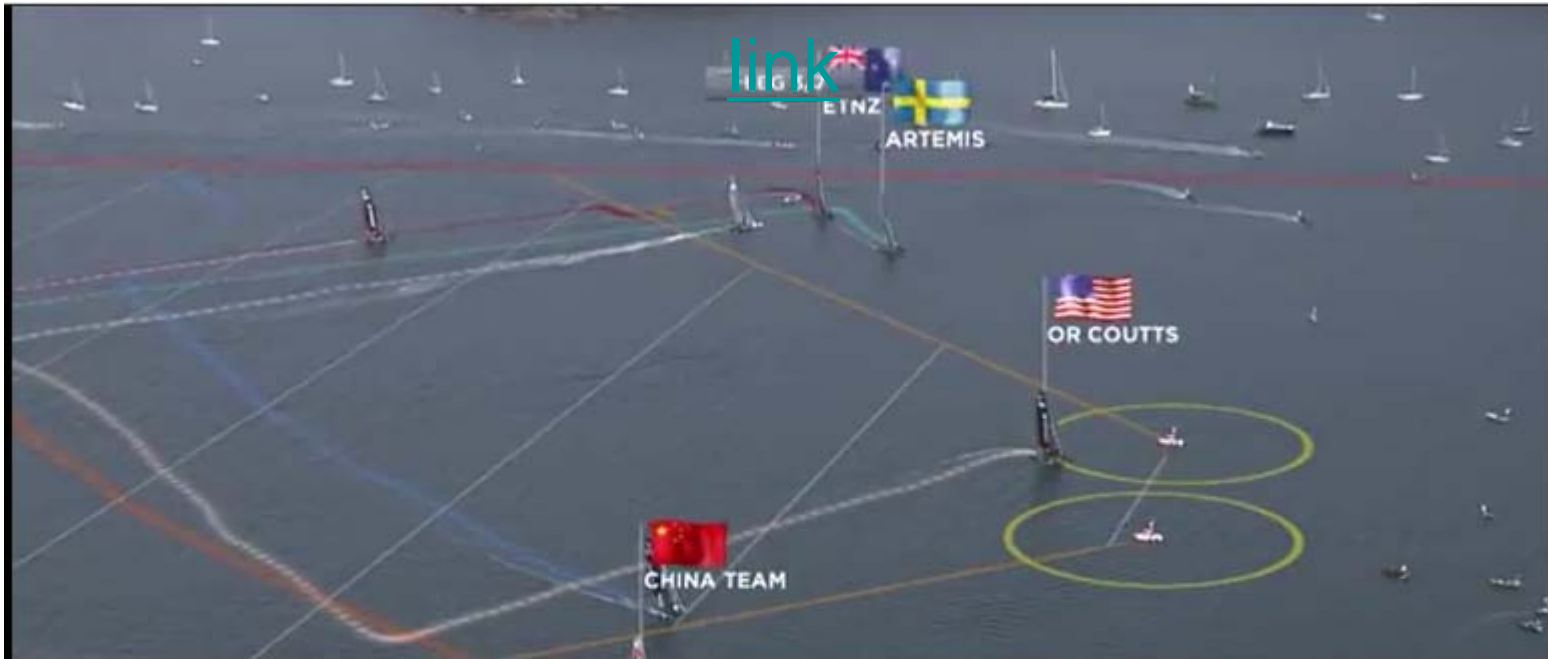
“Augmented” Reality

This year, I duplicated my head:



AR applied to sports

 [Significantly improved visibility of sports on TV:](#)



Virtual flags quickly let viewers tell which boat is which.

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1.4 Overview of Multimedia Software Tools

- The categories of software tools briefly examined here are:
 - 1. Music Sequencing and Notation
 - 2. Digital Audio
 - 3. Graphics and Image Editing
 - 4. Video Editing
 - 5. Animation
 - 6. Multimedia Authoring
-

x 转换 选择

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FTP 目录 /software/ByCompany/Macromedia/ 位于 ftp2.sjtu.edu.cn

若要在 Windows 资源管理器中查看此 FTP 站点，请单击“页面”，然后单击“在 Windows 资源管理器中打开 FTP 站点”。

转到高层目录

10/13/2005 12:00上午	目录	.
02/04/2010 12:00上午	目录	..
09/19/2005 12:00上午	目录	Authorware
10/13/2005 12:00上午	目录	Captivate
10/13/2005 12:00上午	目录	ColdFusion
10/13/2005 12:00上午	目录	Contribute
09/19/2005 12:00上午	目录	Director
10/14/2010 12:00上午	目录	Dreamweaver
10/13/2005 12:00上午	目录	Extension Manager
10/14/2010 12:00上午	目录	Fireworks
10/13/2005 12:00上午	目录	Flash
10/13/2005 12:00上午	目录	Freehand
09/19/2005 12:00上午	目录	Generator20
09/19/2005 12:00上午	目录	Publishing Services
11/01/2005 12:00上午	目录	Studio.MX

Music Sequencing and Notation

- **Cakewalk**: now called Pro Audio.
 - The term **sequencer** comes from older devices that stored sequences of notes (\events", in MIDI).
 - It is also possible to insert WAV files and Windows MCI commands (for animation and video) into music tracks (MCI is a ubiquitous component of the Windows API.)
- **Cubase**: another sequencing/editing program, with capabilities similar to those of Cakewalk. It includes some digital audio editing tools.
- **Macromedia Soundedit**: mature program for creating audio for multimedia projects and the web that integrates well with other Macromedia products such as Flash and Director.

Most of them are available on our FTP server!

Digital Audio

- **Digital Audio** tools deal with accessing and editing the actual sampled sounds that make up audio:
 - **Cool Edit**: a very powerful and popular digital audio toolkit; emulates a professional audio studio –multitrack productions and sound file editing including digital signal processing effects.
 - **Sound Forge**: a sophisticated PC-based program for editing audio WAV files.
 - **Pro Tools**: a high-end integrated audio production and editing environment - MIDI creation and manipulation; powerful audio mixing, recording, and editing software.
-

Graphics and Image Editing

- **Adobe Illustrator:** a powerful publishing tool from Adobe. Uses vector graphics; graphics can be exported to Web.
- **Adobe Photoshop:** the standard in a graphics, image processing and manipulation tool.
 - Allows layers of images, graphics, and text that can be separately manipulated for maximum flexibility.
 - **Filter factory** permits creation of sophisticated lighting-effects filters.
- **Macromedia Fireworks:** software for making graphics specifically for the web.
- **Macromedia Freehand:** a text and web graphics editing tool that supports many bitmap formats such as GIF, PNG, and JPEG.

Video Editing

- **Adobe Premiere:** an intuitive, simple video editing tool for **nonlinear** editing, i.e., putting video clips into any order:
 - Video and audio are arranged in "tracks".
 - Provides a large number of video and audio tracks, superimpositions and virtual clips.
 - A large library of built-in transitions, filters and motions for clip ⇒ effective multimedia productions with little effort.
 - **Adobe After Effects:** a powerful video editing tool that enables users to add and change existing movies. Can add many effects: lighting, shadows, motion blurring; layers.
 - **Final Cut Pro:** a video editing tool by Apple; Macintosh only.
-

Animation

- **Multimedia APIs:**
 - **Java3D:** API used by Java to construct and render 3D graphics, similar to the way in which the Java Media Framework is used for handling media files.
 - 1. Provides a basic set of object primitives (cube, splines, etc.) for building scenes.
 - 2. It is an abstraction layer built on top of OpenGL or DirectX (the user can select which).
 - **DirectX** : Windows API that supports video, images, audio and 3-D animation
 - **OpenGL:** the highly portable, most popular 3-D API.
-

Animation (cont'd)

- **Rendering Tools:**
 - **3D Studio Max:** rendering tool that includes a number of very high-end professional tools for character animation, game development, and visual effects production.
 - **Softimage XSI:** a powerful modeling, animation, and rendering package used for animation and special effects in films and games.
 - **Maya:** competing product to Softimage; as well, it is a complete modeling package.
 - **RenderMan:** rendering package created by Pixar.
- **GIF Animation Packages:** a simpler approach to animation, allows very quick development of effective small animations for the web.

Multimedia Authoring

- **Macromedia Flash:** allows users to create interactive movies by using the score metaphor, i.e., a timeline arranged in parallel event sequences.
 - **Macromedia Director:** uses a movie metaphor to create interactive presentations - very powerful and includes a built-in scripting language, **Lingo**, that allows creation of complex interactive movies.
 - **Authorware:** a mature, well-supported authoring product based on the **Iconic/Flow-control** metaphor.
 - **Quest:** similar to Authorware in many ways, uses a type of flowcharting metaphor. However, the flowchart nodes can encapsulate information in a more abstract way (called **frames**) than simply subroutine levels.
-

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Multimedia Research Topics and Projects

- To the computer science researcher, multimedia consists of a wide variety of topics:
 - 1. **Multimedia processing and coding:** multimedia content analysis, content-based multimedia retrieval, multimedia security, audio/image/video processing, compression, etc.
 - 2. **Multimedia system support and networking:** network protocols, Internet, operating systems, servers and clients, quality of service (QoS), and databases.
 - 3. **Multimedia tools, end-systems and applications:** hypermedia systems, user interfaces, authoring systems.
 - 4. **Multi-modal interaction and integration:**
“ubiquity“ - web-everywhere devices, multimedia education including Computer Supported Collaborative Learning, and de-sign and applications of virtual environments.
-

Current Multimedia Projects

- Many exciting research projects are currently underway. Here are a few of them:
 - 1. **Camera-based object tracking technology**: tracking of the control objects provides user control of the process.
 - 2. **3D motion capture**: used for multiple actor capture so that multiple *real* actors in a *virtual* studio can be used to automatically produce realistic *animated* models with natural movement.
 - 3. **Multiple views**: allowing photo-realistic (video-quality) synthesis of virtual actors from several cameras or from a single camera under differing lighting.
 - 4. **3D capture technology**: allow synthesis of highly realistic facial animation from speech.
-

Current Multimedia Projects (cont'd)

- 5. **Specific multimedia applications:** aimed at handicapped persons with low vision capability and the elderly | a rich field of endeavor.
 - 6. **Digital fashion:** aims to develop smart clothing that can communicate with other such enhanced clothing using wireless communication, so as to artificially enhance human interaction in a social setting.
 - 7. **Electronic Housecall system:** an initiative for providing interactive health monitoring services to patients in their homes
 - 8. **Augmented Interaction applications:** used to develop interfaces between real and virtual humans for tasks such as augmented storytelling.
-

Updated Areas in ICME 2013

- Speech, audio, image, video, text, pattern, signal and location-based media processing
- Multimedia coding, retargeting and transmission
- 3D imaging, visualization, animation, virtual reality and 3DTV
- Multimedia and social sciences, art, entertainment, culture, education, healthcare, ...
- Multi-modal integration, human-machine interaction and human factors
- Multimedia communication, networking and mobility
- Multimedia vision, security, content protection and forensics
- Multimedia databases, digital libraries, and social media
- Multimedia applications, services, interfaces, devices, sensors and systems
- Content analysis, matching and retrieval
- Multimedia standards, trends and surveys
- Multimedia quality assessment, metrics and studies



New Projects in China

Next Generation Broadcasting: NGB



My Old Projects on Multimedia



Architecture for Unified H.264 and AVS decoder sponsored by Micronas AG

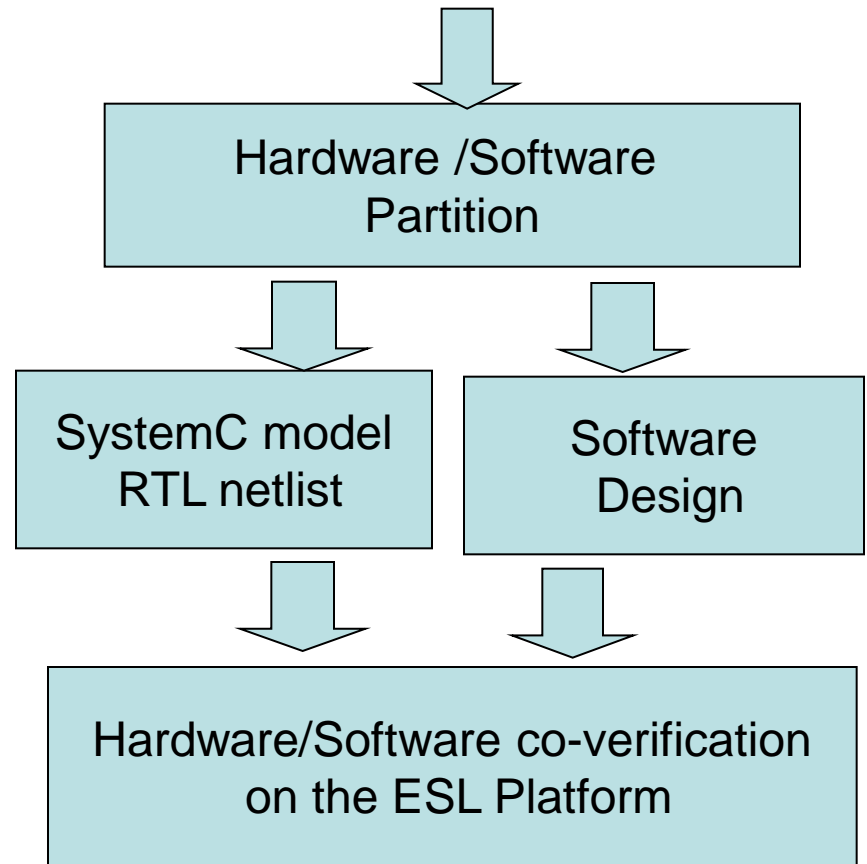
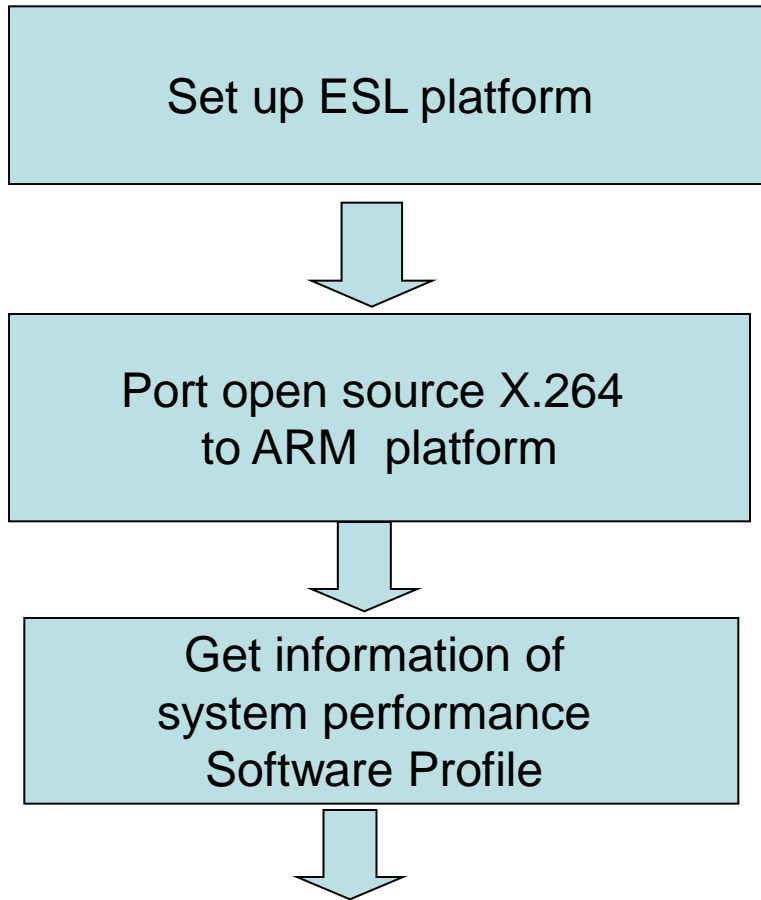


FPGA based acceleration for Computer Tomography (CT) algorithms

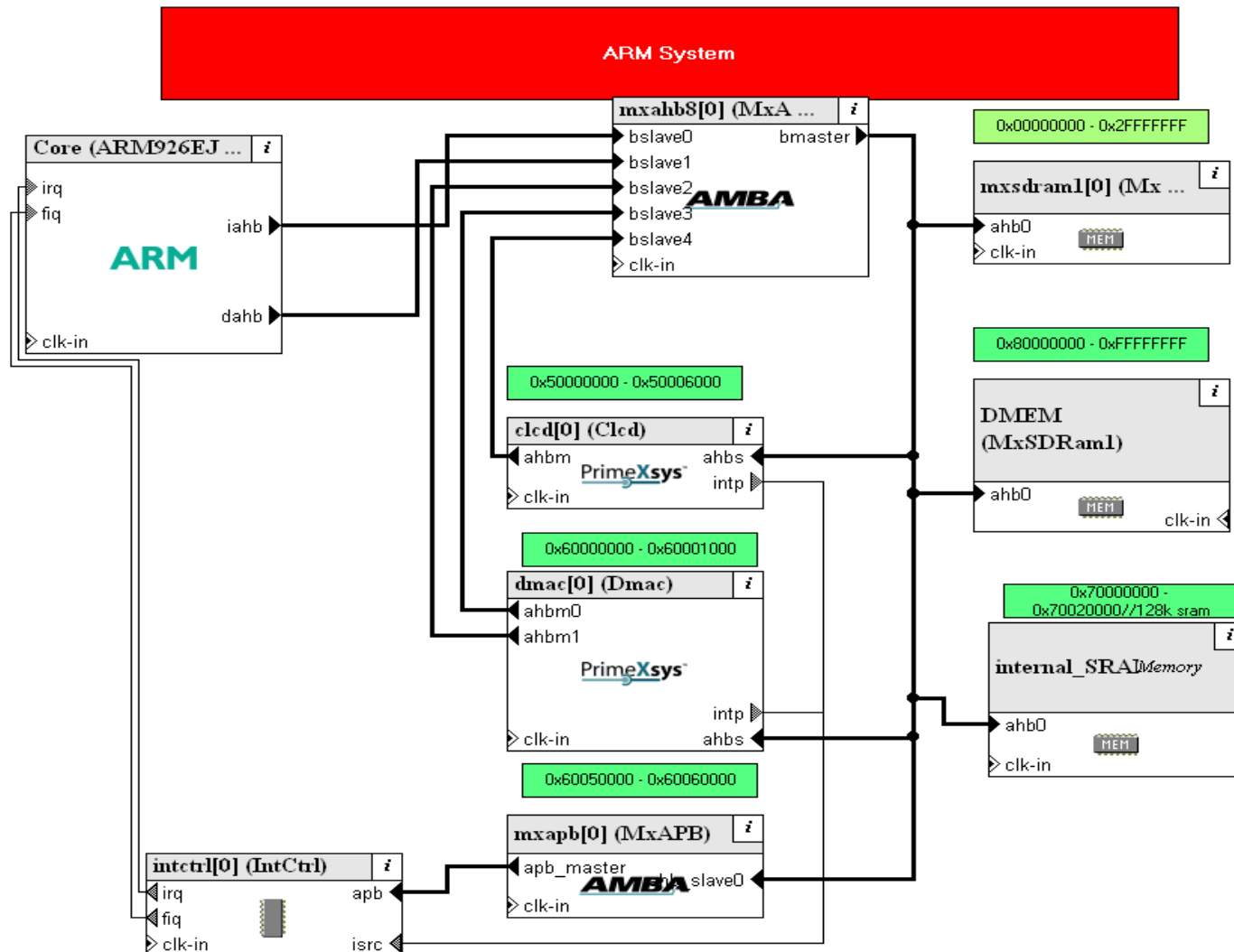
My Old Projects on Multimedia

- Architecture for Unified H.264 and AVS decoder sponsored by Micronas AG:
 - Unified architecture solutions including optimized components and implementation on the FPGA with the corresponding SW/HW co-design.
 - Benchmarking H.264 and AVS decoders to produce detailed analysis of algorithms and protocols
 - Profiling of decoding algorithms and identification of differences and synergies by decoding
 - Hardware modeling and implementation of IDCT, Intra-prediction, Inter-prediction and Loop filter modules.
-

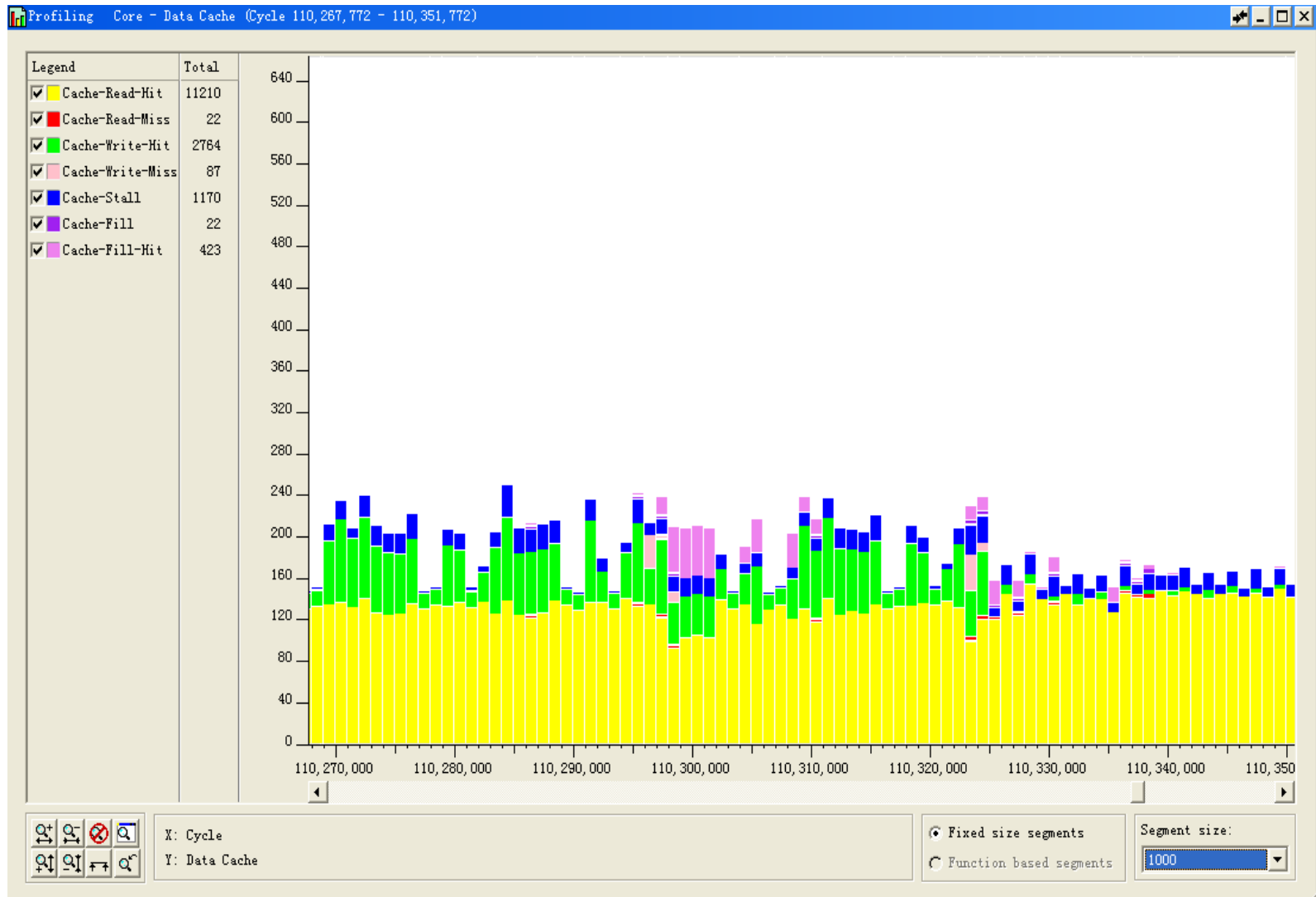
ARM Based ESL Design for H.264 Encoding



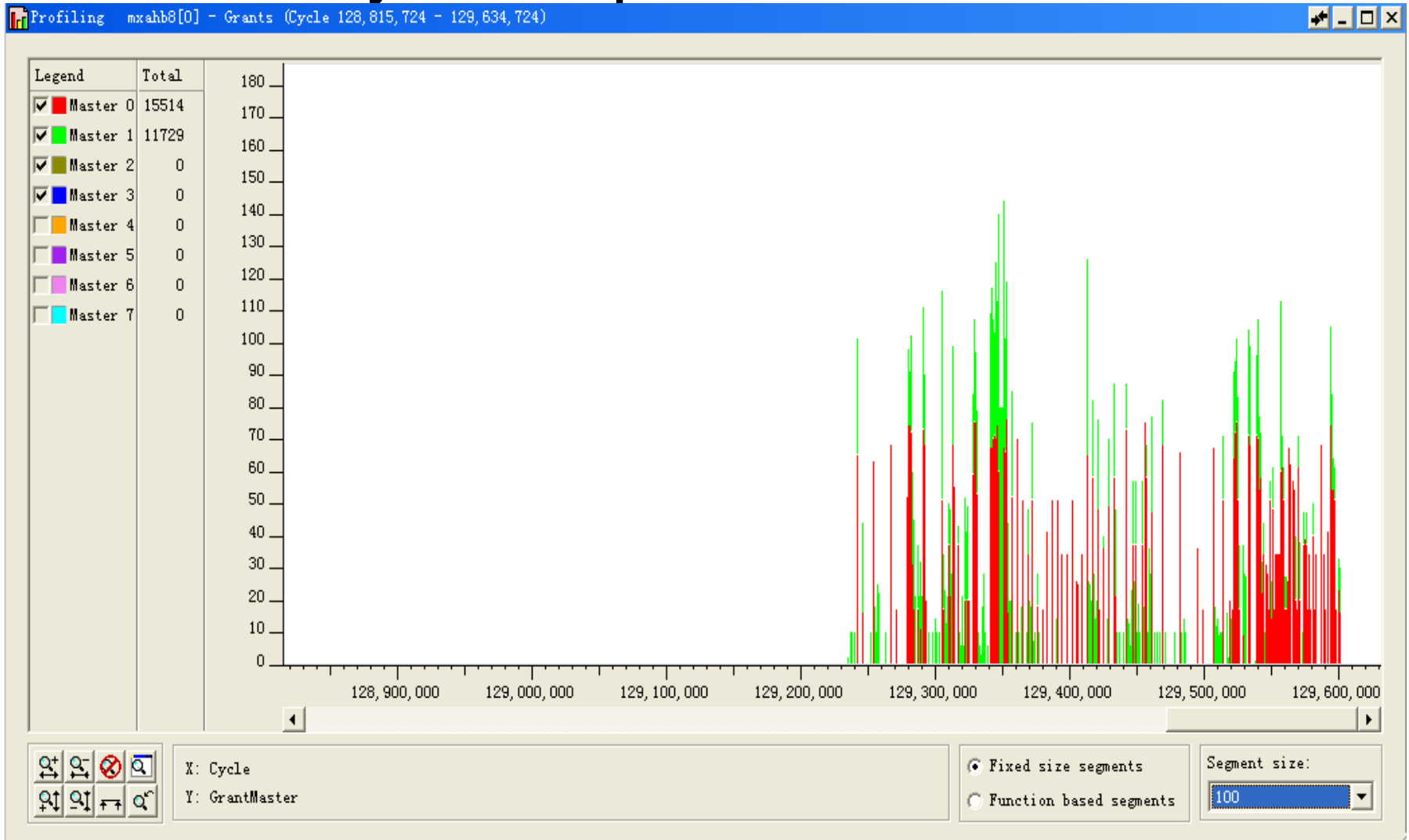
ARM Based ESL Platform – cont.



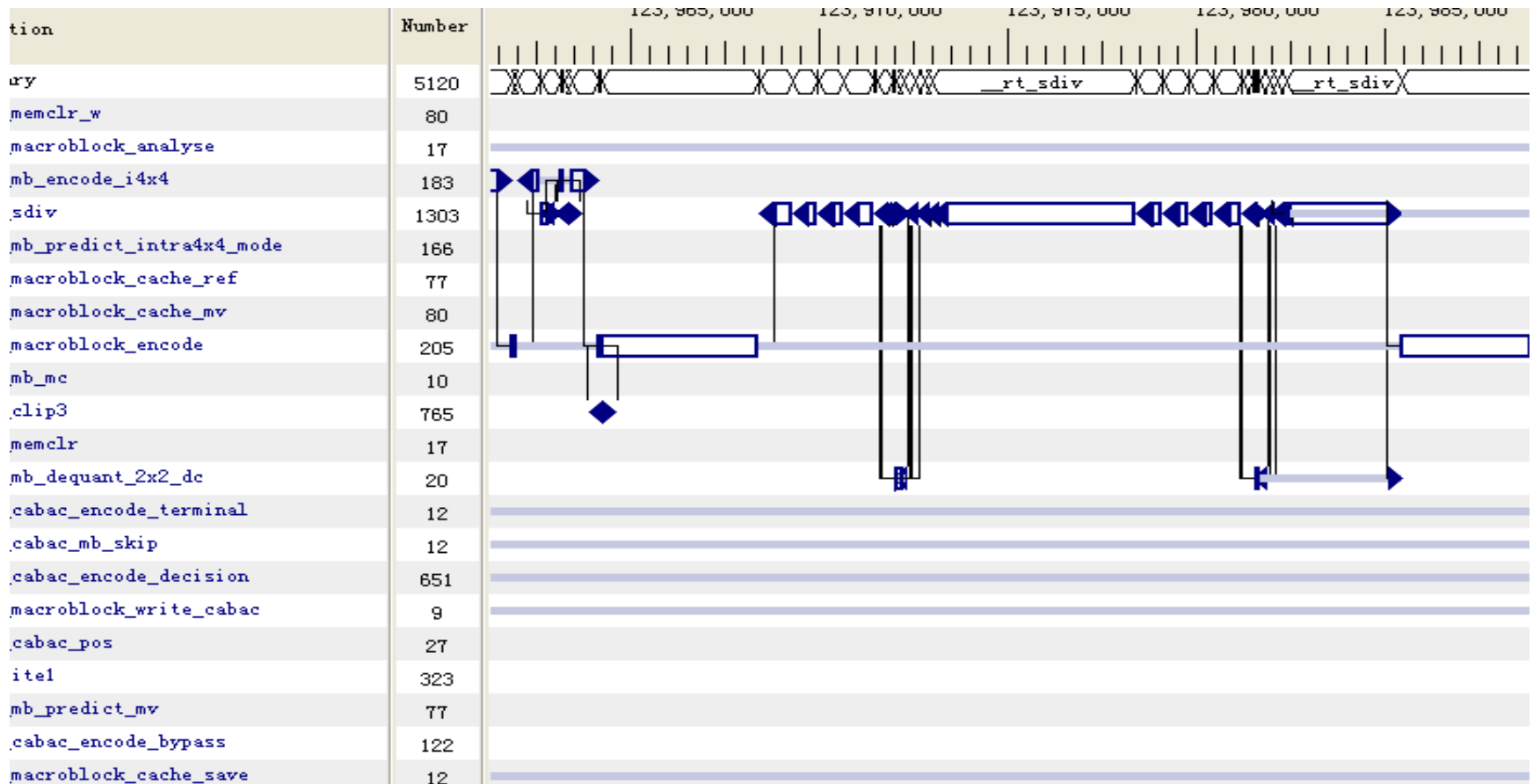
Analysis Report – Cache Information



Analysis Report – Bus Profile



Analysis Report – Software Profile



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了解更多



1.6 Further Exploration

- In Chapter 1 of the Further Exploration directory, the website provides links to much of the history of multimedia.

<http://www.cs.sfu.ca/mmbook>

- Other links in the text website include information on:
 - IEEE Multimedia:
<http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=93>
 - **ACM/Springer Multimedia System Journal**
<http://springerlink.metapress.com/content/100377/>
 - IEEE Transactions on Multimedia:
<http://www.ieee.org/organizations/society/tmm/>
 - Nicholas Negroponte's work at the MIT Media Lab.
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