



CS 414 – Multimedia Systems Design
Lecture 1 - Introduction

Klara Nahrstedt
Spring 2008



Overview

- Course information (personnel, policy, schedule, misc.)
- What is Multimedia?
- What is happening in Multimedia domain?
- Summary



Instructor

- Klara Nahrstedt

- PhD University of Pennsylvania

- Research:

- Multimedia distributed systems (overlay multicast, peer-to-peer systems, service composition),
 - Multimedia operating systems (soft-real-time scheduling, caching),
 - Multimedia networking (routing, QoS management, pricing),
 - Multimedia applications (multi-camera tele-immersive systems)
 - Multimedia security



Overview

- *Office Assistant:*
 - Anda Ohlsson (ohlsson@cs.uiuc.edu) for Klara Nahrstedt
- *Teaching Assistant:*
 - William Conner
- Class Website
<http://www.cs.uiuc.edu/class/sp08/cs414/>
- Newsgroup: uiuc.class.cs414



Required Readings for cs414

- Required Textbook:

- *Media Coding and Content Processing*, Ralf Steinmetz, Klara Nahrstedt, Prentice Hall, 2002

- *Multimedia Systems*, Ralf Steinmetz, Klara Nahrstedt, Springer Verlag, 2004

- Papers!!! (required reading since many areas are not covered in present textbooks)



Course Prerequisites

- CS 241 – pre-requisite **MUST, otherwise the class will be hard, especially the MPs!!!**
- You need to know
 - System/C Programming on top of Linux
 - Socket Programming
 - Thread Programming
 - Locks/Semaphore Synchronization/Programming
 - Basic System Principles – File Systems, Memory Management, Process Management, I/O Management, Network Programming



Facilities and Office Hours

- **Laboratory Facilities**

- CSIL-linux machines, 216 SC, equipped with cameras and microphones, connected to high-speed Ethernet

- **Office hours: available in web page**

- KN: Mon/Wed, 9-10am, Office: 3104 SC
- WC: Tue/Thu, 2:30-3:30pm, Office: TA office – will be announced



About this course...

Principles

- Multimedia System concepts
- Multimedia System design
- Some theory
- Rationale
- Practice

Goals

- Understand Digital Audio/Video Media
- Understand Multimedia Systems decisions
- Get hands dirty

Expect (Some) Pain

Fast pace

Hard material

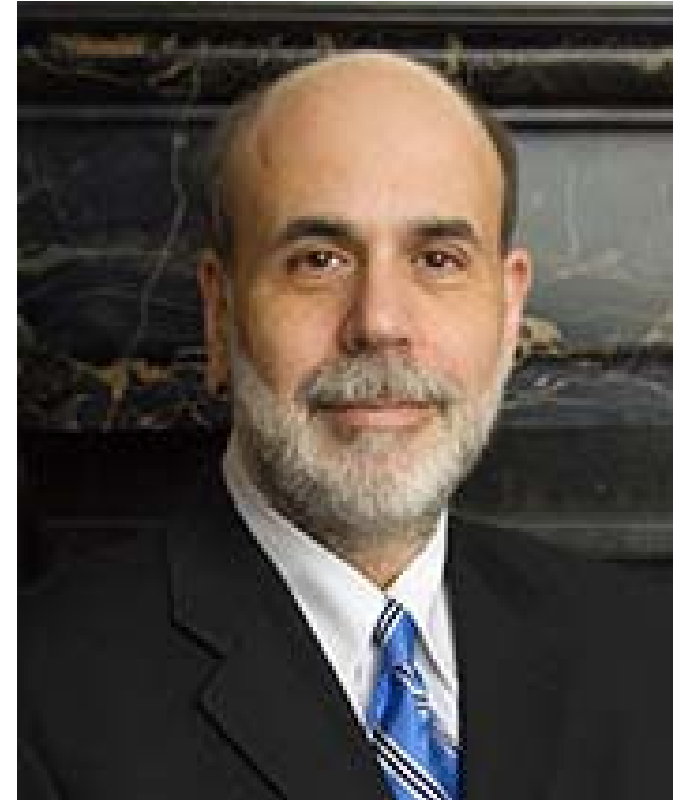
4 MPs (programming)

2 Homework

1 Midterm and 1 Final
(Comprehensive) Exam

But....

Students survived past cs414!



Ben S. Bernanke
(Image Source:
www.federalreserve.gov)



Grading

- Final exam: 35%
- Mid-exam: 15%
- 2 Homework: 10%
- Peer Evaluation: 5%
- 4 MPs: 35% (depending on the difficulty each MP will have different weight
 - 1st MP – 7%
 - 2nd MP – 8%
 - 3rd MP – 10%
 - 4th MP – 10%



Grading policy

- Gradebook system: <http://compass.uiuc.edu>
- Late policy for MPs and Homework Assignments
 - **No Late Policy**
- It is your responsibility!
 - Check announcements in lectures, newsgroups, or web pages
- MPs will be done in **Groups of 3-4 students**
- MPs done on Linux machines in 0216 SC




Group Setup

- Setup Groups between 1/14 and 1/20
 - Use newsgroup to find group partners
- Email to TA William (wconner@uiuc.edu) your group formation by **1/20**
 - **If you cannot find a group, email immediately to the TA William – email your request as well as skills you can bring to the table.**
- TSG will setup accounts for groups.
- Between 1/21 and 1/25 the TA (Shuo) will inform each group their login and password to start to work on the Linux machines.



Peer Evaluation

- By 4/30 each peer submits 'peer evaluation of his/her group
- Evaluation will include
 - His/her own self-evaluation
 - His/her evaluation of each group member for each MP
 - Evaluation should include contribution of each member to each MP
 - Evaluations will be sent to instructor only
 - Evaluations will be known only to the instructor, i.e., will not be revealed neither to any other group members nor TA.



Peer Evaluation – form submitted to instructor at the end of the semester

	MP1	MP2	MP3	MP4
Self-Evaluation				
Group Member X				
Group Member Y				
Group Member Z				



Re-grading policy

- Students have **1 week** (after the grade for homework/MPs/exam is released into the gradebook) to request for re-grading
- Re-grading requests need to be in **writing** to the TA
- After the re-grading period, **no** re-grading request will be granted for this Homework/MP/exam.



Cheating Policy

- Academic integrity
- Your homework and exams must be your own - we have a zero tolerance policy towards cheating of any kind and any student who cheats will get a **failing** grade in the course.
- Both the cheater and the student who aided the cheater will be held responsible for the cheating
- Machine problems will be graded per group, i.e., each member gets the same number of points.



Lecture Format

- Help you understand important and hard Media and Multimedia Systems concepts
- Lectures do not cover everything
 - Not all questions in homework or exams are from lectures
- Students responsibility
 - Attend lectures
 - Read textbooks
 - Homework, MP, Exam
 - Periodically check web page
 - Read/utilize newsgroup



MPs (Deadlines)

MP1, 5pm, 2/8/2008	Audio/Video Recording and Playback
MP2, 5pm, 2/22/2008	Audio/Video Streaming Protocols
MP3, 5pm, 4/4/2008	Multi-Source/Multi-Hop Synchronized Streaming Protocols
MP4, 5pm, 4/30/2008	IPTV channel switching interface and final integration demonstration

- Q&A Session before each MP due date
- MP releases and Q&A Session dates will be announced on the course web page/newsgroup



IPTV Project

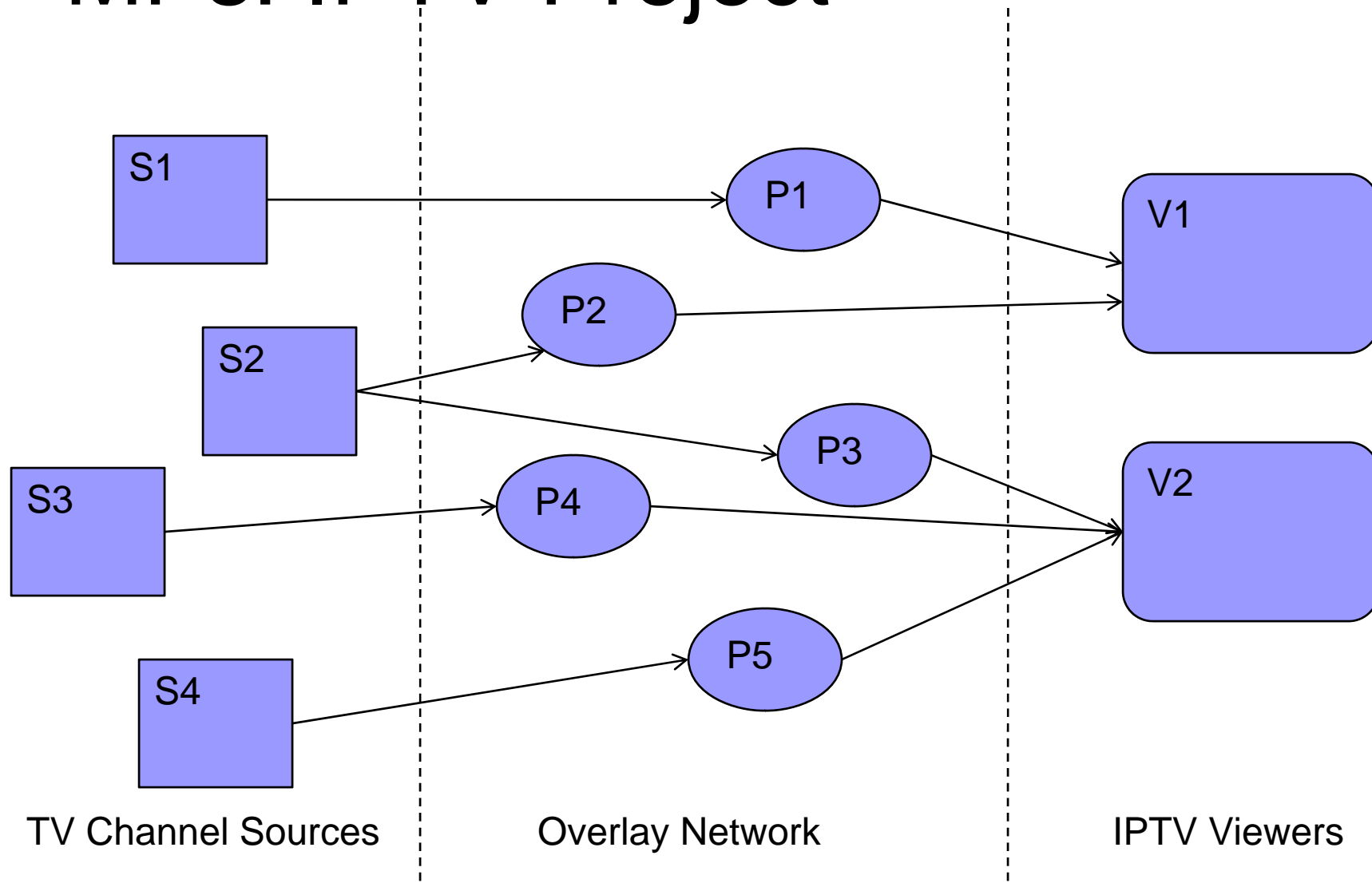
- 4 MPs will hang together and at the end should yield one large system IPTV
- Choose group members carefully and be committed to the group since if you leave, you may leave the group with piece of code that they will have to live with through the rest of the MPs
- Document your MPs/code carefully



IPTV project

- All groups will be in competition and we will announce the winning group
- The final demonstration on 4/30 will be seen by and evaluated not only by the instructor and TA but also by Pavlov Company, and others
- Winning group will be featured on the departmental website.

MPs: IPTV Project



Homework & Exams

2/22-2/29, 5pm	HW1
3/3, Monday, 11-11:50am 1103 SC	Midterm Exam (In- class)
4/18-4/25, 5pm	HW2
5/3, Saturday, 8- 11am Room: TBD	Final Exam

- Announcement in web page
- No makeup homework
- **No** makeup exams unless with **documented** medical emergency



1/4 Unit Project: graduate students

- Final grade is decided upon 3/4 unit performance
- 1/4 unit project: pass or fail
- Individual or group of two
- Choices
 - Implementation project
 - Animation project
 - Survey
- **Proposal due: 2/15, Friday, 5pm, by email to klara@cs.uiuc.edu**
- Details in web page



Digital Media Revolution

- Digital camcorders, cameras, MP3 players
 - but also location sensors, speech, gestures, etc.
- Digital media enables new forms of expression
 - inform, educate, entertain, provoke, etc.
 - multi-sensory, emphasizes temporal over spatial
- Digital media places the power of mega production studios at the fingertips of the user
 - record, edit, process, play, and share digital media
 - profound social, cultural, educational, technological, and communicative impact – its just now beginning



Multimedia Requires

- Multiple media
 - discrete or continuous
 - at least one continuous
- Coordination
 - temporal or spatial
- Interaction
 - user exercises control



Related Terms

- Media

- representation* of information
- text, graphics, images, sound, etc.

- Medium

- how that representation is communicated
- TV, Radio, Print, Web

- Multimodal




Aspects of Multimedia

- Capture
- Representation
- Storage
- Transmission
- Processing
- Information exchange
- Presentation
- Perception



This Class

- Perception
 - auditory perception, visual system, cognition
- Multimedia Systems Design
 - compression, QoS, Multimedia Processing (process scheduling, buffer management, device management), multimedia servers, multimedia networking, synchronization
- Multimedia User Interface Design
- Multimedia Applications (video conferencing, tele-immersion, VoD, Skype...)



Where's the Action in Multimedia?

- Enable amateurs to take pictures and shoot video like the pros
- Interfaces for organizing, retrieving, and accessing large collections of content
- Capturing and sharing experiences
- Multi-source/multi-party collaborative systems
- 3D media
- P2P Streaming (IPTV)



After this lecture...

- Browse the web site
- Subscribe to newsgroup
- Login to csil machines
- Setup Groups: 1/14-1/20(email to William about group formation)
- Think what are the next generation of multimedia systems/applications?
- Name multimedia applications that you know