Commercial Video Servers

Microsoft Tiger
Sun MediaServer

Hardware Architecture of Sun MediaServer

- **Multiprocesssor Server**
- Two system boards: each with
  - two 60 MHz Supersparcs
  - **128 Mbytes of RAM**
- Two system boards containing no CPUs and no memory
- Two internal 2.1 Gbyte Fast disks (not for media file storage)
- (Slow network connection) 10Base-T Ethernet
- One 5-GB (4mm) internal tape drive
- Internal CD-ROM drive

- **High Bandwidth Connection to Disk System:**
  - Six Disk controller SBUS cards with six Fast/ Wide SCSI connectors
- **High-Bandwidth Network Connection:**
  - Five Sun Fast Ethernet cards
- **Disk Array:**
  - thirty 2.1 GB drives
  - Six Fast/Wide SCSI connectors with cables

File System Features

- Guaranteed stream delivery rate
- Independent streams (true VOD)
- Efficient use of disk bandwidth (50-90%)
- Disk striping
- Transfer data from disk array to network with minimum processor involvement
- RAID-3 (parity)
- 64-bit file system; File sizes up to 2^{64}-1
- Solaris-based
- Fast-forward and rewind using separately encoded trick play streams

- Must provide an index file that maps offsets of MPEG I-frames between trick play stream and content stream
- Random access: can start/stop a stream at nearly arbitrary points -- go to nearest content packet (MPEG-2 transport) of the program stream
- Admission control

Software subsystems

1. Media File System Layout Manager: allocates and deallocates disk blocks using striping
2. Scheduler: sorts and schedules disk I/O, manages bit pump buffers, admission control, schedules output driver activity
3. Bit pump: allocates internal buffers, transfers data between disk and output drivers
4. Output driver: output device managment, encapsulates data for output medium
5. Disk driver: efficient transfers between disk and internal buffers

Notes:

- **Content Loading**
  - Store in tar format on 4mm or 8mm tape
  - Use utility to store onto media file system
- **Formats and Bit Rates**
  - MPEG-1 and MPEG-2
  - Supports coding rates up to 8 Mbit/sec
  - Currently only CBR (constant bit rates)
- **Timestamps: with respect to reference timebase**
- (e.g., frame has timestamp indicating play time)
- **Encapsulation: MPEG-2 transport packet (breaks data into small packets) or MPEG-2 program stream (large packets)**