General Design Ideas on "OMA Box" Video Recording System

A. Schiffler, March 2002

Introduction

OMA (StatementStation) is a mobile video recording studio to create a video forum.

General Ideas

We want to equip the OMA box with a computer system capable of:
- capturing and editing digital video/audio in the box studio
- process digital video/audio
- store digital video/audio
- upload digital video/audio to a server
- capture video/audio from remote computers
- manage a local web-based database and interface

Hardware

First we secure independent power with a generator. 3000W is sufficient for about 6 PCs, flatscreens and the video and audio equipment. Additional power must be supplied for lighting. All equipment is mounted in a 19" rack. The power supply is prepared with a rackmounted USV. Networking is supplied with a Gigabit Ethernet backbone via a switch. External connectivity is achieved with a directional Ethernet bridge at 20Mbps. Mobile stations are connected with consumer grade wireless LAN adaptors. Video and audio inputs are routed to the processing PCs from controllable cameras and microphones. Lighting is also controllable. Extra PCs are available for hight quality background processing of video (compression, etc).

The OMA rack contains several computer systems.
- 1x network router/firewall bridge
- 1x terabyte file server
- 2x video capture and editing station
- 2x video processing station
- 1x webserver

Additionally the box employs several laptops with wireless connectivity.
- 4x portable video capture laptops

The internet component is outsourced at a hosting facility. It contains the following components
- 1x file server clone
- 1x webserver clone

The OMA system and the remote system are kept in sync via the network and serve as a backup of each other. New data can be entered in either system and resyncs when OMA is online.

All systems should be redundant (i.e. always get two of the same kind).

Other equipment for automating the production:
- network controllable cameras
- MIDI controllable lighting
- MIDI controllable mixer

Software

There are several software components that need to be developed

Windows Based:
1. studio software for automating capture (OMA studio frontent)
2. mobile/internet software client for capture and viewing of content (mobile/internet user frontent)
3. video processing software (OMA studio backend)

Linux Based
4. multimedia database for storage and classification (OMA studio backend)
5. web backend for multimedia database (hosted webserver)
6. fileserver synchronization software (OMA-webserver connectivity)
7. network and system management software

The information flow could be as follows:

(1) records a session and stores it into (4). A mobile/internet user view this via (5) on the client software (2). Editing is applied via (3). Since the webcontent has been changed, the studio updates via (6). The operator monitors the proper functioning of this via (7).

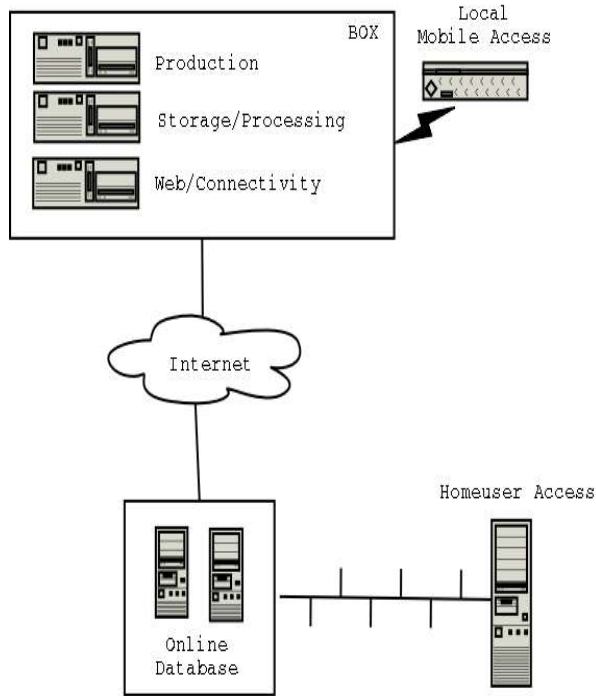# Diagrams

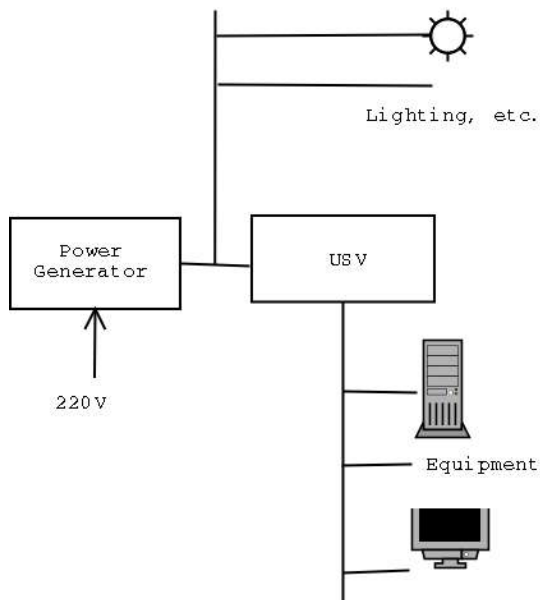## Fig 1: The Big Picture
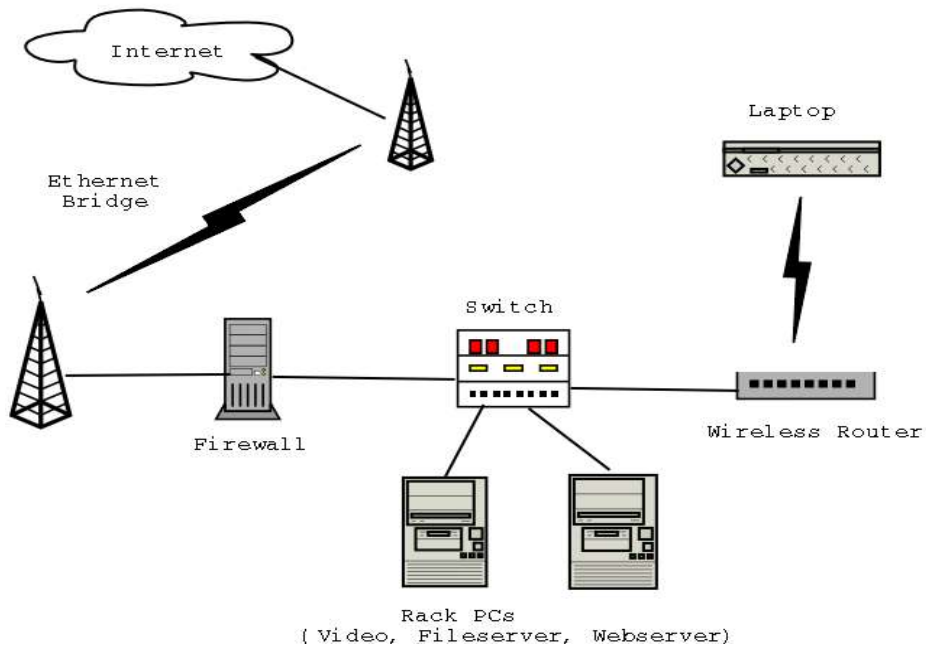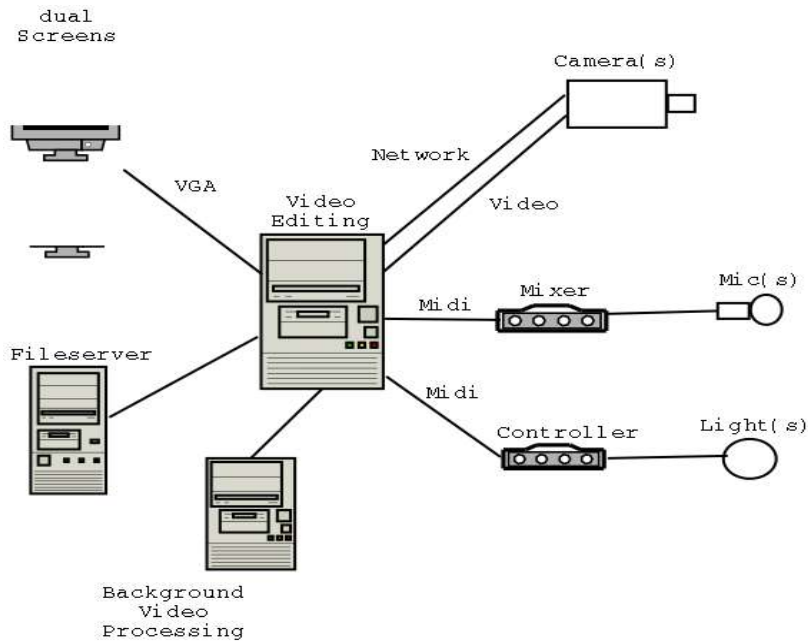

Fig 2: Power

Fig 3: Networking

Fig 4: Editing

Companies

List of companies with products that might be interesting (Feb 2002).

Imaging
- Basler Vision Technologies
- Redlake MASD
- Schneider Optics
- Sony Industrial Cameras
- Tamron
- Volpi

Storage
- 3ware
- Atto
- Drastic Technologies
- Eurologic
- Medea
- QLogic

Video
- AVID
- Boris FX
- Canopus Corporation
- Contour Design
- Drastic Technologies
- In:Sync
- Incite
- Inscriber
- JL Cooper Electronics
- Matrox Video Products Group
- Newtek
- Optibase
- Real Networks
- Sonic Solutions
- Terran Interactive
- Winnov
- Zapex

Books

Principles of Multimedia Database Systems
http://www.mkp.com/books_catalog/catalog.asp?ISBN=1-55860-466-9
US$ 63

Practical Digital Libraries: Books, Bytes, and Bucks
(Morgan Kaufmann Series in Multimedia Information and Systems) by Michael Lesk
Hardcover: 300 pages ; Dimensions (in inches): 0.85 x 9.55 x 7.69
Publisher: Morgan Kaufmann Publishers; ISBN: 1558604596; (July 1997)
US$ 61

Digital Libraries
by William Y. Arms
Paperback: 304 pages ; Dimensions (in inches): 0.69 x 9.12 x 6.26
Publisher: MIT Press; ISBN: 0262511274; (September 1, 2001)
US$ 25

Distributed Multimedia Databases: Techniques and Applications
by Timothy K. Shih (Editor)
Hardcover: 384 pages ; Dimensions (in inches): 1.10 x 9.92 x 7.50
Publisher: Idea Group Publishing; ISBN: 1930708297; (January 7, 2002)
US$ 80

Digital Video Essentials: Plan, Shoot, Edit, Share
by Erica Sadun
Paperback: 272 pages
Publisher: Sybex; ISBN: 0782141986; 1 edition (January 13, 2003)
US$ 21

Content-Based Image and Video Retrieval
(Multimedia Systems and Applications Series, 21) by Oge Marques, Borivoje Furht
Hardcover: 200 pages ; Dimensions (in inches): 0.67 x 9.64 x 6.12
Publisher: Kluwer Academic Publishers; ISBN: 1402070047; (May 2002)
US$ 135

Video Database Systems: Issues, Products and Applications
(Kluwer International Series on Advances in Database Systems, 5)
by Ahmed K. Elmagarmid (Editor), Haitao Jiang
Hardcover: 178 pages
Publisher: Kluwer Academic Publishers; ISBN: 0792398726; (March 1997)
US$ 141

Image and Video Retrieval: International Conference, Civr 2002, London, Uk, July 18-19, 2002. Proceedings

(Lecture Notes in Computer Science, 2383)
by [Civr](#), [Uta Priss](#) (Editor), [Michael S. Lew](#), [Rodolphe N. Meyer](#)
Hardcover: 388 pages
Publisher: Springer Verlag Pub (Computer Bks); ISBN: 3540438998; (September 2002)
US$85

Perspectives on Content-Based Multimedia Systems
(The Kluwer International Series on Information Retrieval, 9)
by [Jian Kang Wu](#), [Mohan S. Kankanhalli](#), [Joo-Hwee Lim](#), [Dezhong Hong](#)
Hardcover: 408 pages
Publisher: Kluwer Academic Publishers; ISBN: 0792379446; (August 2000)
US$ 115

Continuous Media Databases
by [Aidong Zhang](#) (Editor), [Avi Silberschatz](#) (Editor), [Sharad Mehrotra](#) (Editor)
Hardcover: 160 pages
Publisher: Kluwer Academic Publishers; ISBN: 0792378180; (February 1, 2000)
US$ 105

Advances in Multimedia and Databases for the New Century: A Swiss/Japanese Perspective
by [Yoshifumi Masunaga](#) (Editor), [Stefano Spaccapietra](#) (Editor)
Hardcover: 214 pages ; Dimensions (in inches): 0.67 x 11.31 x 8.82
Publisher: World Scientific Publishing Co., Inc.; ISBN: 9810243103; 1st edition (April 15, 2000)
US$ 65

Networked Media Fileserver

Pogo Linux StorageWare 3800
- -Dual Intel P4 Xeon Processors
- -PC2100 DDR Memory
- -3Ware 8-Port IDE Raid Card (Level 5)
- -1120GB Actual Redundant Storage Capacity
- -Optional External Storage Expansion Module
- -Seperate 40GB Operating System Hard Drive
- -Intel 10/100 Ethernet Adapter
- -Slim CD-ROM
- -1.44MB Floppy Drive
- -Red Hat Linux
- -PogoConf, NAS Software, Ext3 Journaling FS

Upgrade to Gigabit Ethernet
http://www.pogolinux.com/systems/servers/StorageWare/index.html#sw3800
US$ 7200

Stationary Video Capture and Editing Station

Video Capture and Editing System Example
Processor(s): Dual AMD Athlon MP 2000 1.8GHz
Memory: 4 x PC266 512MB ECC DDR Registered
System Harddrive: ST380021A Barracuda 80GB ATA100 7200rpm
Display Card: Parhelia 512 - 3-Head
Monitor(s): Dual Monitor, VX900 TFT w/ Speakers
CD Drive #1: DVR-A04 DVD-R/RW,CD-R/RW Writer
Floppy Drive: 3.5" 1.44MB COOL GRAY
Operating System: Windows XP Professional CD OEM
Keyboard: Keyboard PS/2 Black/Silver
Mouse: Intellimouse Explorer - PS/2 & USB
Power Supply: Power Supply: 460W Athalon MP
Case: Server Case Aluminum
Service Contract: One-Year Service Contract
Video Editing Card: RT.X100
Jogshuttle Controller: ShuttlePRO
Video Harddrive(s): Western Digital WD1200JB 120GB 7200RPM
Audio Card: SoundBlaster Live!
Speakers: Speakers: Flat Panel
Audio Software: 1001 Sound Effects CD
 ACID Pro 3.0
 Sound Forge 6.0/Noise Reduction 2.0 Bundle
 Vegas Audio 2.0
3D Rendering Software: LightWave 3D 7.5 Super Bundle
Training Materials: Getting Started With Adobe Premiere 6 Premiere 6.0 Tutorial
http://www.sharbor.com
US$ 9200

Video Processing System Example
Processor(s): Dual AMD Athlon MP 2000 1.8GHz
Memory: 4 x PC266 512MB ECC DDR Registered
System Harddrive: ST380021A Barracuda 80GB ATA100 7200rpm
Display Card: Parhelia 512 - 3-Head
Monitor(s): Monitor, VX700 TFT w/ Speakers
CD Drive #1: CD-RW 32x10x40 Drive IDE
Floppy Drive: 3.5" 1.44MB COOL GRAY
Operating System: Windows XP Professional CD OEM
Keyboard: Keyboard PS/2 Black/Silver
Mouse: Intellimouse Explorer - PS/2 & USB
Power Supply: Power Supply: 460W Athalon MP
Case: Server Case Aluminum
Service Contract: One-Year Service Contract
Video Editing Card: RT.X100
Video Harddrive(s): Western Digital WD1200JB 120GB 7200RPM
Audio Card: SoundBlaster Live!
Speakers: Speakers: Flat Panel
http://www.sharbor.com
US$ 5400

Matrox RT.X100

Matrox RT.X100 is the first of the new generation of Matrox products to incorporate "The Power of X" - a new architecture that leverages the scalable power of your CPU with the explosive performance of dedicated hardware for the ultimate realtime video editing experience.

Matrox RT.X100 delivers many unique professional features that are not available on any other video editing card in its class. It's ideal for corporate communicators, event videographers, project studios, educational facilities, and digital filmmakers.

…

http://www.matrox.com/video/products/rtx100/home.cfm

US$ 1100

Mobile Video Capture and Editing Station

Sony Vaio PCG-C1MWP1
Sony VAIO® C1MW PictureBook™ Series Notebook
Powerful ultra-light with integrated camera!
US $2290

Linksys WPC54A
Instant Wireless PC Card
The Wireless PC Card now has a new higher-powered antenna that provides greater ranges than ever. The increased sensitivity helps filter out interference and "noise" to keep your signal clear. Improved error correction in the chipset keeps you operating at higher transmission rates for longer distances. And, since you only need one Type II or III PCMCIA CardBus slot, you're free to use your other slots for additional accessories. …
Up to 72Mbps Turbo Mode.
http://www.linksys.com/Products/product.asp?grid=22&prid=430
US$ 140

Box Networking

Linux Rackmount Servers
http://directory.google.com/Top/Computers/Hardware/Systems/Linux

Dell PowerConnect 5224 Gigabit Switch
The Dell PowerConnect 5224 is Dell's top-of-the-line Gigabit Ethernet Managed Switch. The 5224 is a 10/100/1000BASE-T auto-sensing Gigabit Ethernet Switch that offers 24 ports. Four 10/100/1000BASE-T ports operate in combination with four Small Form Factor Pluggable (SFP) transceiver slots. The 5224 is comparable with these other types of products, with which you might be more familiar: 3Com's SuperStack 4300 family, Cisco's Catalyst 2950G Series and Foundry Network's FastIron 4802 Series. The PowerConnect 5224 is also available in a 48-port version, which Dell brands as its 3248 Series.
http://www.dell.com/us/en/biz/products/series_pwcnt_5000_networks.htm
http://www6.tomshardware.com/network/02q4/021029/index.html
US$ 2200

Wireless Connectivity (Box–Backbone)

Wavespan Stratum 20 Wireless Ethernet Bridge
Wavespan's initial product offering, the 5800 Wireless Ethernet Bridge, provided Enterprises and Service Providers with the fastest throughput available for wireless systems operating in the ISM band. The 5800 delivers 10 Mbps full-duplex throughput for IP and Ethernet applications with fiber-class reliability.
http://www.commputercations.com/products/wavespan.htm
http://www.epinions.com/Proxim_Stratum_20_LR_20Mbps_X_2_Full_Duplex__Networking_Adapters_2021_05/display_~full_specs
US$ 13320

Wireless Connectivity (Box-Mobile)

Linksys WAP51AB
Dual-Band Wireless Access Point
The Instant Wireless™ Dual-Band Wireless Access Point works simultaneously with both 802.11a and 802.11b wireless standards to bring you the ultimate in wireless freedom. …
http://www.linksys.com/Products/product.asp?grid=22&prid=452
US$ 255

Linksys WAP54A
Instant Wireless Access Point
The Instant Wireless™ Wireless Access Point's highpowered antenna offers a range of operation of up to 328 feet indoors, providing seamless roaming throughout your wireless LAN infrastructure; an advanced user authentication feature ensures a high level of network security. …

Up to 72Mbps Turbo Mode.
http://www.linksys.com/Products/product.asp?prid=428&grid=22
US$ 350

Network Controllable Camera

Axis AXIS 2130 PTZ Network Camera
The AXIS 2130 PTZ Network Camera is an all-in-one integrated networked pan/tilt/zoom camera that allows users to remotely control the pan/tilt/zoom function live over a local area network or the Internet.
http://www.axis.com/products/cam_2130/index.htm
US$ 1580

Independent Power Supply

Honda EU3000is 3000W Superquiet Generator
Super quiet generator with 3000 Watts at Maximum output. 135 lbs. with Eco-Throttle & Optional Parallel Operation Connection Cable. Can operate 20 hours on less than 3.5 gallons of gasoline! Our most popular model for Recreational Vehicle usage. Connect (2) generators and double the wattage! (with optional parallel connection cable)
http://www.hondapowerequipment.com/gensupframe.htm
US$ 1520

APC APC Smart-UPS 3000VA RM 3U XL Uninterruptable Power Supply
APC Smart-UPS RM, 3000VA/2400W, Input 120V/ Output 120V, Interface Port DB-9 RS-232, SmartSlot, Extended runtime model, Rack Height 3 U
http://www.apc.com/resource/include/techspec_index.cfm?base_sku=SU3000RMXL3U&language=en&LOCAL.APCCountryCode=US
US$ 1800

Controllable Lighting

American DJ "Show Designer" Intelligent Light Controller
Designed to control a wide variety of DMX intelligent lighting fixtures. Comes with a large library of fixture settings for many different brands of lighting equipment. Can control up to 512 channels. Can control up to 16 large fixtures (up to 32 channels each) or 16 groups of smaller fixtures. Can hold up to 1024 scenes, 512 presets, 256 chases and 256 shows. Fixtures and memories are quickly selectable from an array of 16 switches. 8 faders allow direct control of channel settings for 32 channel fixtures using a bank switch. Large rotary wheel for control of pan and tilt as well as chase speed, crossfade times or for data entry. Pan and tilt can also be controlled using a standard PC trackball. 32 character backlit LCD display for easy programming. Rear panel has 3 pin XLR connector for DMX512 output with a polarity switch to accommodate different types of cable requirements. Rear panel also has MIDI in, MIDI out, audio input and trackball connector. Software updates can be easily downloaded off the internet and directly loaded into Show Designer from any Windows PC connected to the trackball connector using a standard PC serial laplink cable
http://www.brookmays.com/prod_disp.asp?itemnum=SHOWDESIGNER
US$ 1000

MIDI Controllable Audio

Sound Sculpture Studio Switchblade MIDI Matrix Mixer
With an incredible 16-IN x 16-OUT matrix (8 x 8 for the Switchblade 8 and 8B) you can connect any input to any output simultaneously including unlimited merge and split (up to 32 "patches total for GL and Studio models, 16 for SB8B and SB8). … Besides interconnection, the switchblade offers powerful mixing capabilities. The volume level of every connection or "patch" is independently programmable over a 48dB range in calibrated increments.
http://www.soundsculpture.com/products/switchblade_models.htm#studio
US$ 1725