

OPERA -

***Building Your Next-Generation
Multimedia WWW***

Presented by

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The Chinese University of Hong Kong

Co-Sponsored by



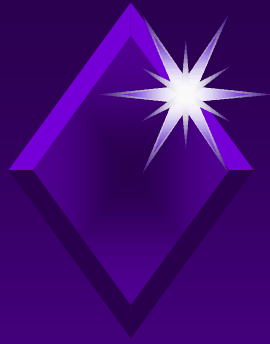
Area of Excellence in Information Technology



Outline

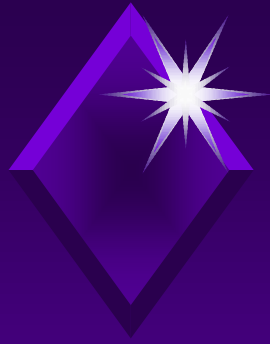
- ◆ Background
- ◆ Challenges
- ◆ The OPERA Platform
- ◆ OPERA Availability
- ◆ New Opportunities
- ◆ The Future
- ◆ Q&A

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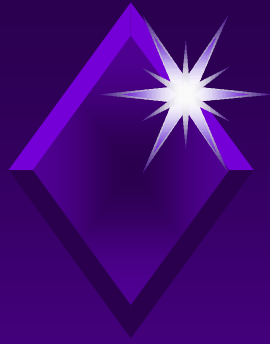
1. Background

- ◆ Today' s WWW
 - ◆ Primary Text (HTML)
supplemented by Images, Graphics, and Animations
 - ◆ Low bit-rate audio/video streaming
 - ◆ Usable content types are limited by the user-end bandwidth (norm: modem at 56kps)



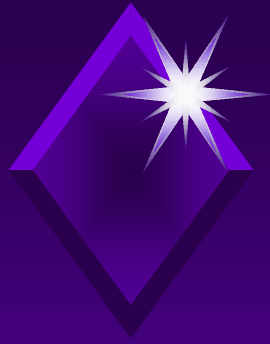
1. Background

- ◆ Recent Developments
 - ◆ Residential Broadband Internet Access
 - ◆ Ranging from 1Mbps to over 10Mbps
 - ◆ Intelligent Commercial Buildings
 - ◆ Fiber-ready, bandwidth over 10Mbps
 - ◆ Convergence of TV and the Internet
 - ◆ Internet on the TV
 - ◆ Audio/Video on the Internet



2. *Challenges*

- ◆ Enlarged market with more user diversity
 - ◆ Variety of Viewing Devices
 - ◆ Computer, TV Set-top-box, PDA, WAP phone, ...
 - ◆ Variety of Connection Speeds
 - ◆ 28.8kbps, 56kbps, 384kbps, 512kbps, 1.5Mbps, etc.
 - ◆ Variety of Viewing Software
 - ◆ RealPlayer, Windows Media Player, QuickTime, ...
 - ◆ Variety of Languages
 - ◆ Cantonese, English, Mandarin, Japanese, ...



2. *Challenges*

◆ Content Providers

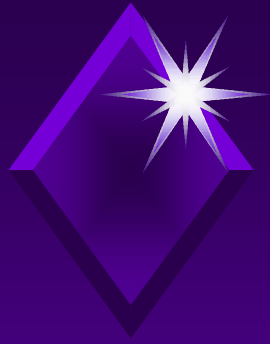
- ◆ How to cope with the many different user requirements?
 - ◆ Lowest common denominator means lowest quality, even for users with broadband access.
 - ◆ High quality, high bit-rate contents will render the content inaccessible to many narrowband users.
 - ◆ Maximize market penetration -> cater for the majority of the user requirements.



2. Challenges

The screenshot shows a Netscape browser window titled "OPERA Demo - Netscape". The address bar shows "http://www.hkcl.org/Demo/index.html". The page content includes the "OPERA Technology" logo, a "CYBERLibrary" logo, and a "Normal Case" button. A large red question mark is overlaid on the page, pointing to a table of video files. The table has columns for "Bandwidth / Size", "Real", "Micro", and "Apple". The "Real" column lists files like "qcif.can.28.rm", "qcif.put.28.rm", and "qcif.eng.28.rm". The "Micro" column lists files like "qcif.can.56.asx", "qcif.put.56.asx", and "qcif.eng.56.asx". The "Apple" column lists files like "qcif.can.28.mov", "qcif.put.28.mov", and "qcif.eng.28.mov". The "Language" column has buttons for "粵語", "普通話", and "English".

Bandwidth / Size	Real	Micro	Apple	Language
28.8 k	qcif.can.28.rm qcif.put.28.rm qcif.eng.28.rm		qcif.can.28.mov qcif.put.28.mov qcif.eng.28.mov	← 粵語 ← 普通話 ← English
56 k		qcif.can.56.asx qcif.put.56.asx qcif.eng.56.asx	qcif.can.56.mov qcif.put.56.mov qcif.eng.56.mov	← 粵語 ← 普通話 ← English
80 k	cif.can.isdn.rm cif.put.isdn.rm cif.eng.isdn.rm	cif.can.isdn.asx cif.put.isdn.asx cif.eng.isdn.asx	cif.can.isdn.mov cif.put.isdn.mov cif.eng.isdn.mov	← 粵語 ← 普通話 ← English



2. *Challenges*

- ◆ Content Providers
 - ◆ Traditional Web Design
 - ◆ Confusing to the web users
 - ◆ Difficult to maintain
 - ◆ Destroys any good web design
 - ◆ What we really want is ...



2. Challenges


OPERA Technology
An Online Platform for Multimedia Resources and Content

CYBERLibrary

with OPERA

About
News & Events
Technology
Distributions
Consortium
Forum

With OPERA-enabled system, different bit-rate, player format and language links can be unified into a single Universal Multimedia Resource Locator (UMRL). This not only save the space for page layout, it also alleviate the complication of multiple links.



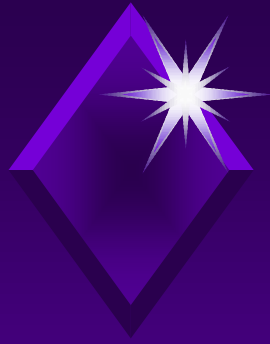
Just One Single Link
[CUHK UMRL](#)
*represents
different Streaming Bit-rate,
different Encoding Player,
and Multilingual*

Maintained by: [HKCL Project Group](#)
Last Updated: Tuesday, 9 May, 2000
All Rights Reserved



2. *Challenges*

- ◆ Internet Service Providers
 - ◆ Complex content management
 - ◆ Which media version is located at which server?
 - ◆ Content updating, cycling, etc.
 - ◆ Complex server management and maintenance
 - ◆ How to perform server maintenance without disrupting service?
 - ◆ When to replicate media to more servers?
 - ◆ Higher cost and poor resource utilization



2. *Challenges*

◆ Internet Service Providers

◆ What we really want is ...

◆ Lower content management overhead

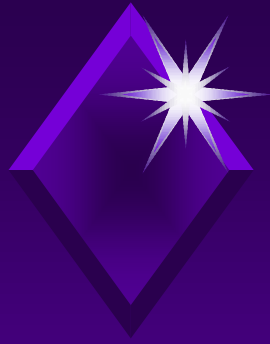
- ◆ Automatic media upload, replication, etc.

◆ More up time

- ◆ Maintain media server without service disruption
- ◆ Automatic failover in case of server failures

◆ Better resource utilization

- ◆ Optimized, automatic replication to multiple servers
- ◆ Optimized, automatic redirecting of requests to local servers



3. The OPERA Platform

◆ OPERA

- An **O**pen **P**latform for **M**ultimedia **R**esource **E**xchange

◆ An open-source, software platform that solves **ALL** of the previous Challenges (and more)

◆ Compatible with existing browsers and servers

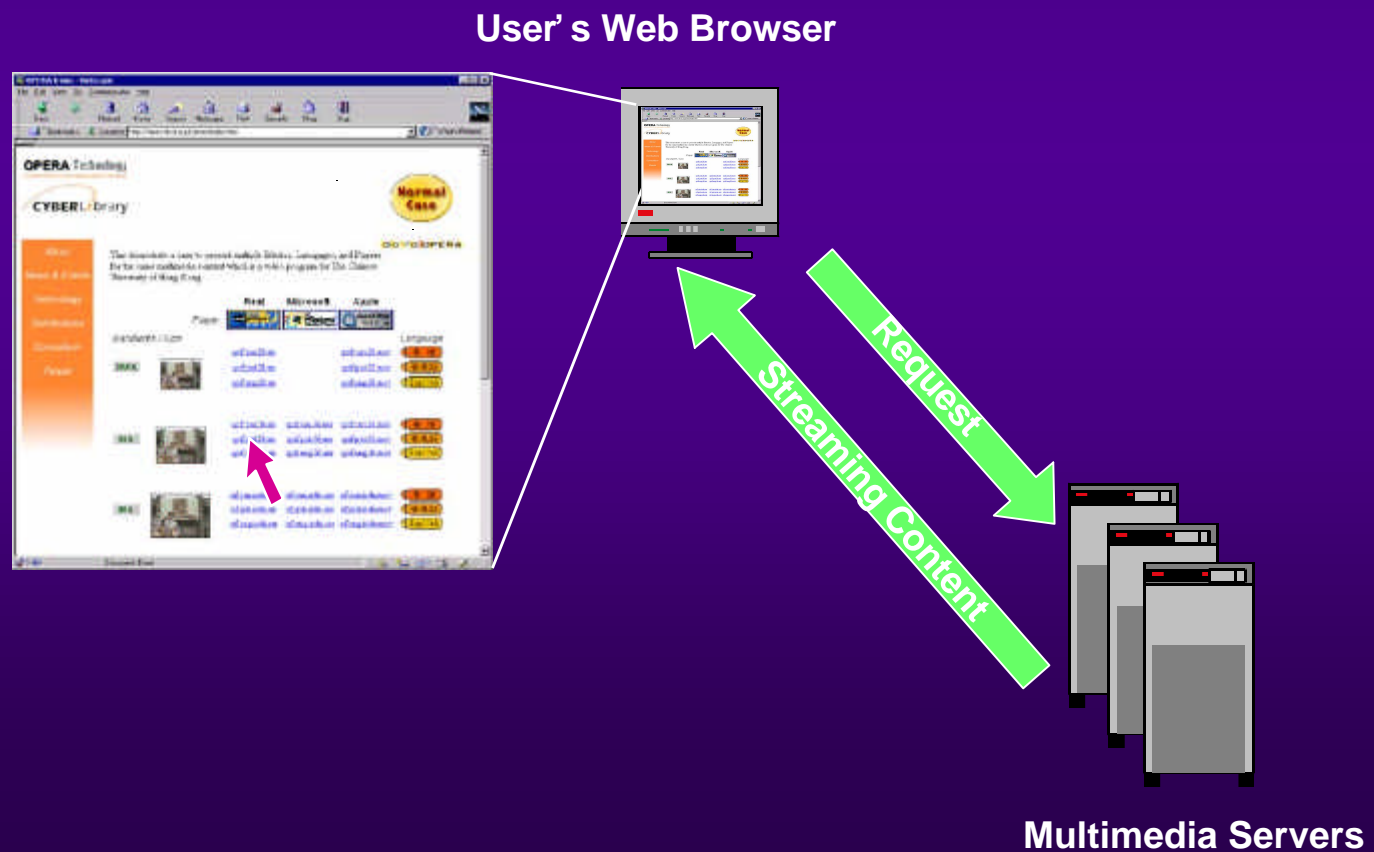
◆ Funded by the Innovation and Technology Commission of the HKSAR Government

◆ **FREE** for all Hongkong-based Companies



3. The OPERA Platform

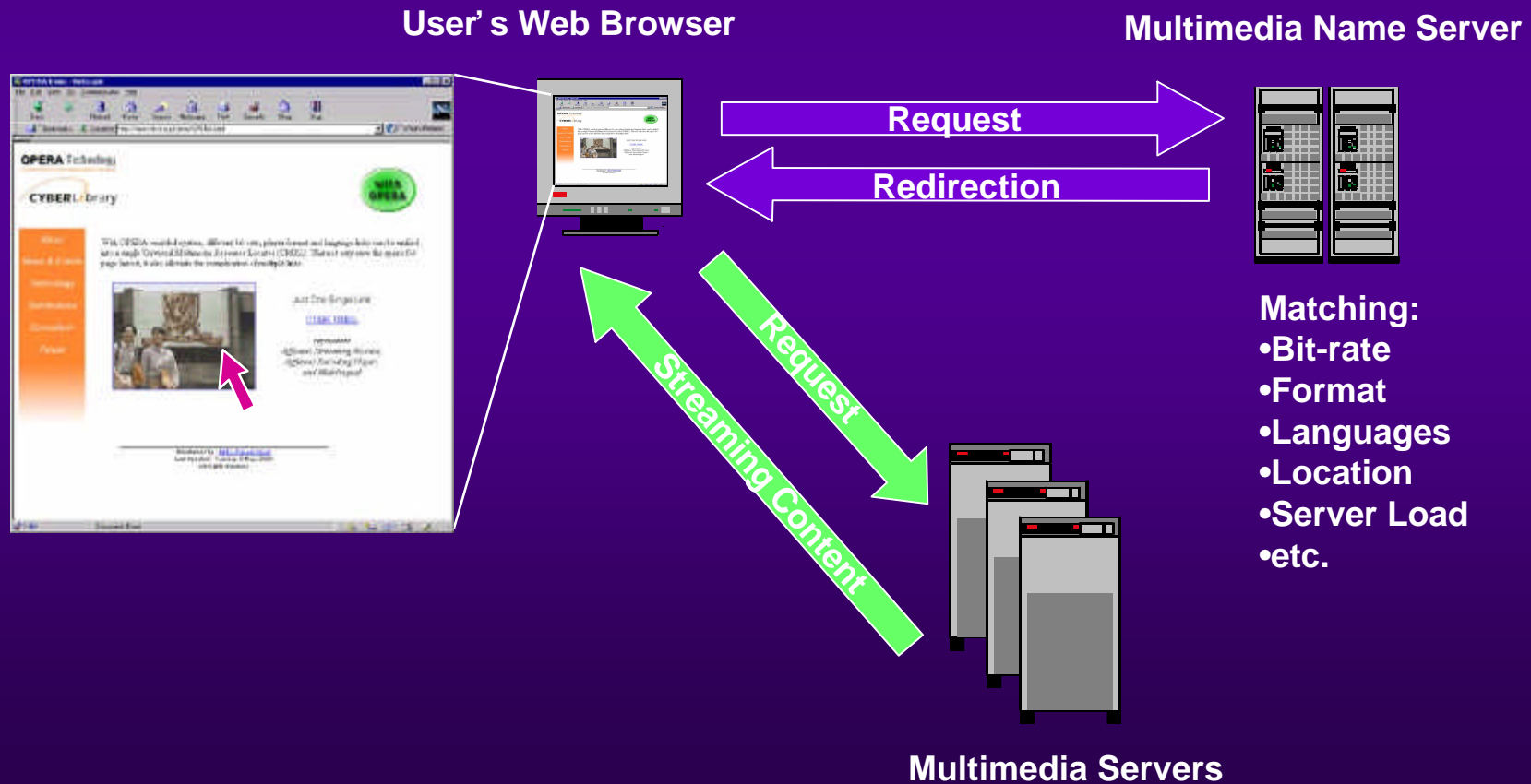
◆ Traditional Media Streaming

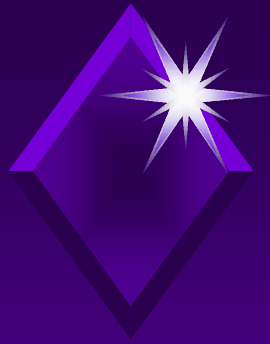




3. The OPERA Platform

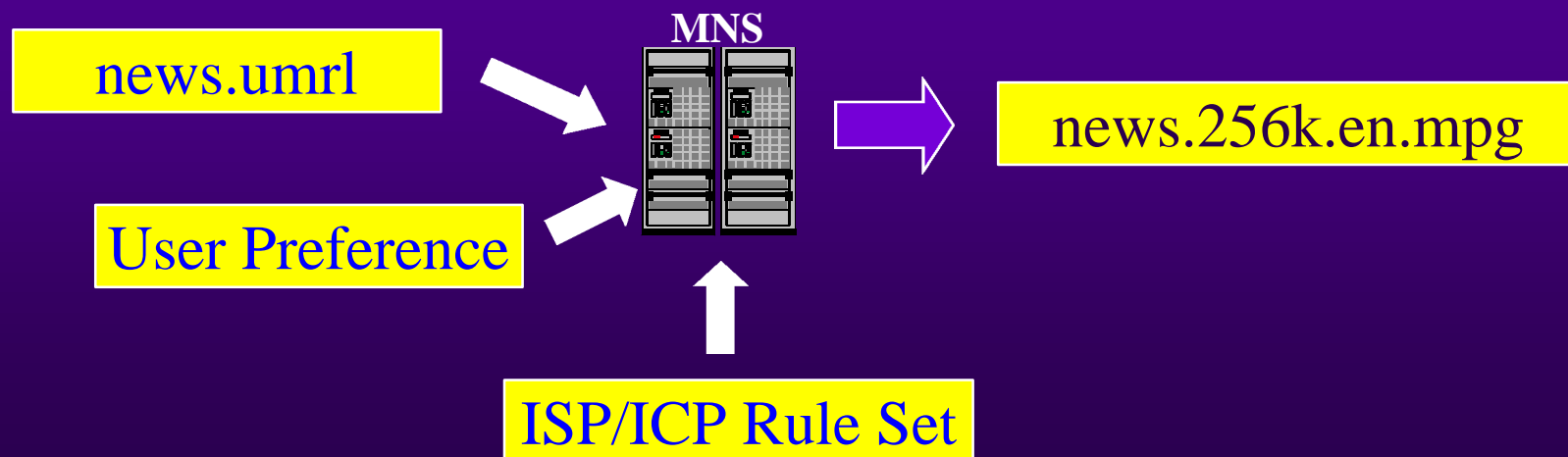
◆ OPERA-based Media Streaming

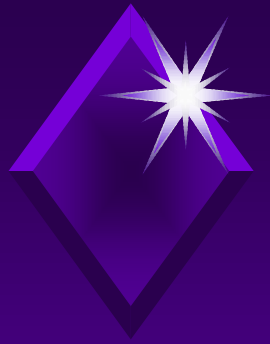




3. *The OPERA Platform*

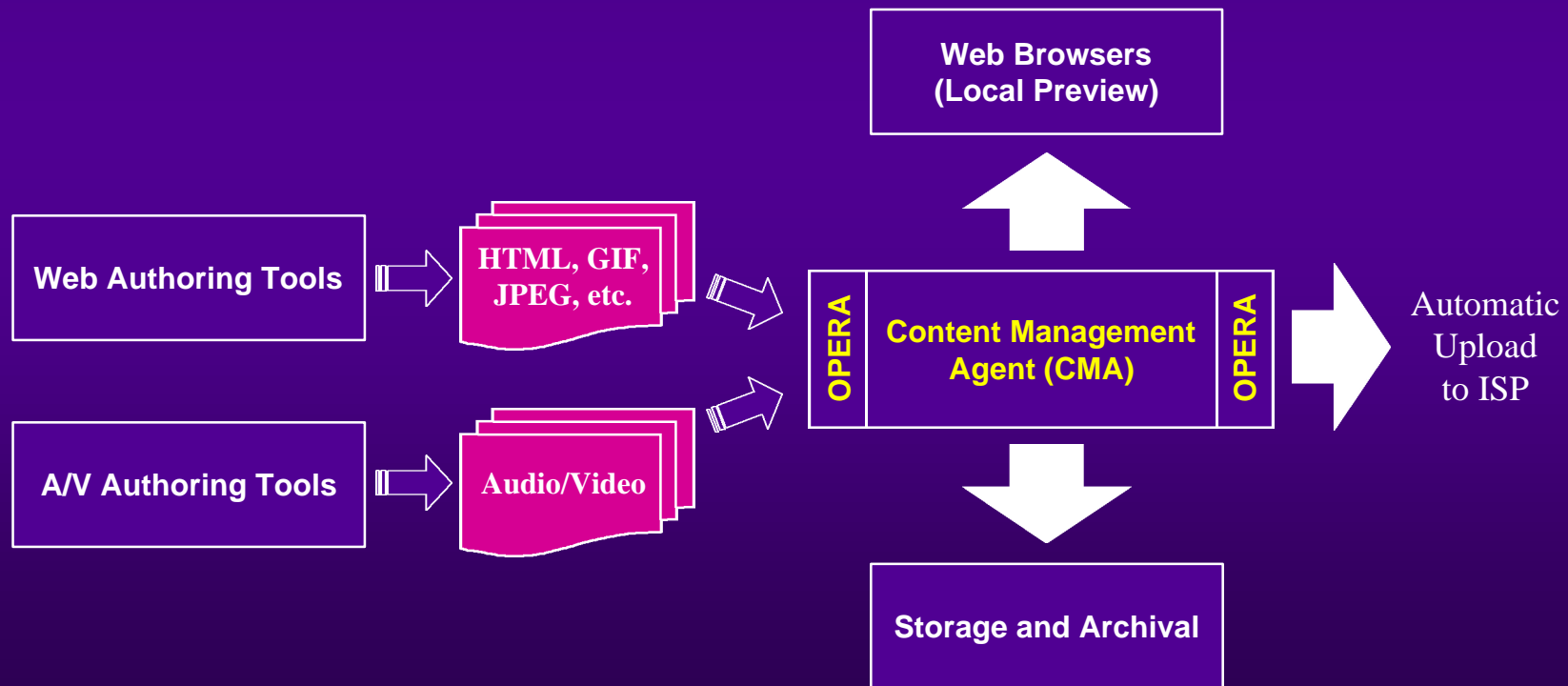
- ◆ Universal Multimedia Resource Locator
 - ◆ A logical address for a media object
 - ◆ Independent of format, bit-rates, languages, etc.
- ◆ Dynamic Mapping to URL:

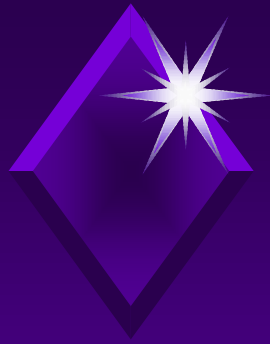




3. *The OPERA Platform*

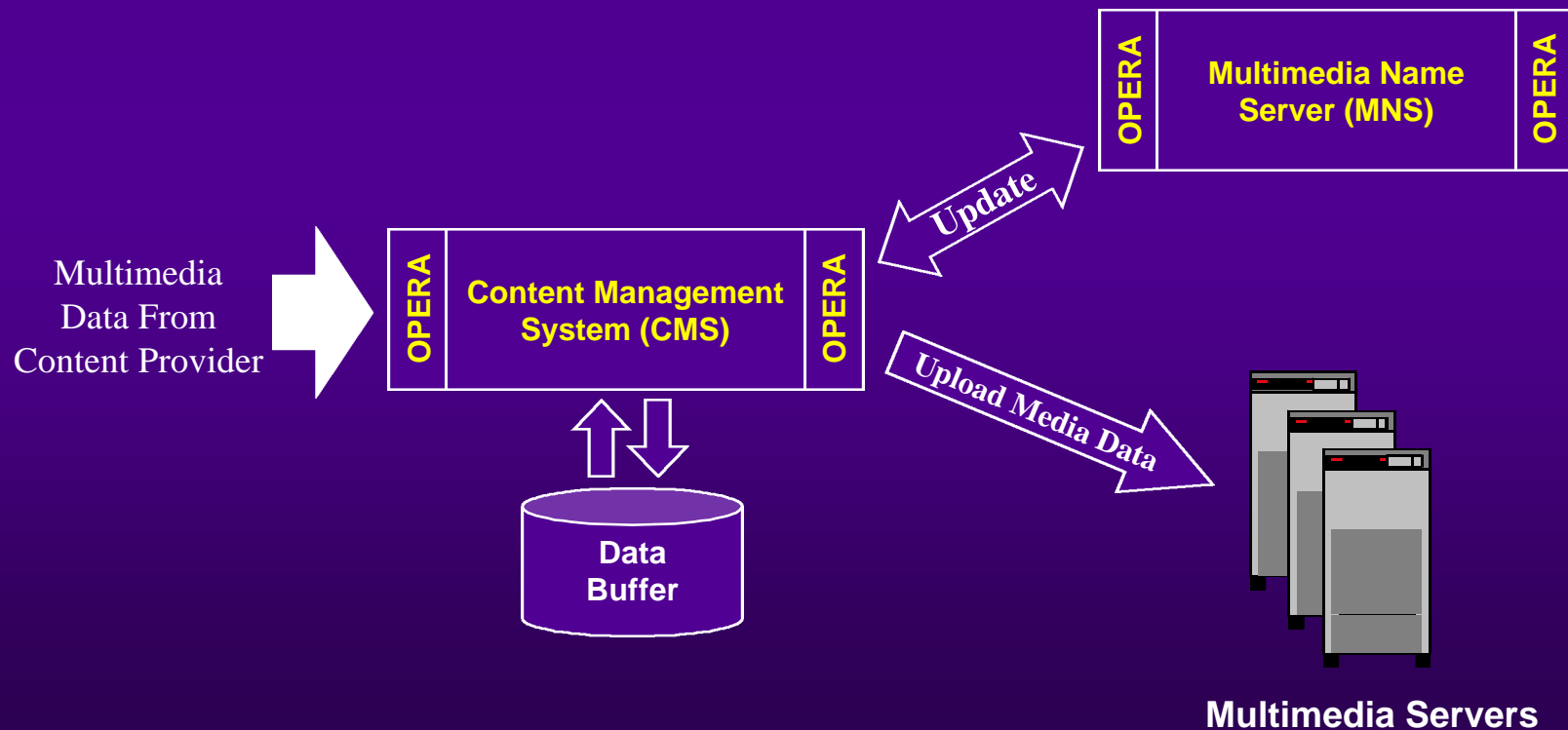
◆ Content Authoring and Transfer

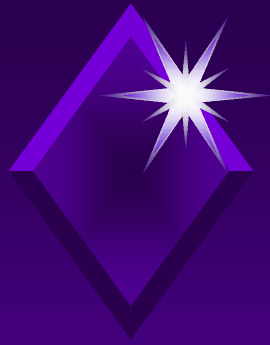




3. *The OPERA Platform*

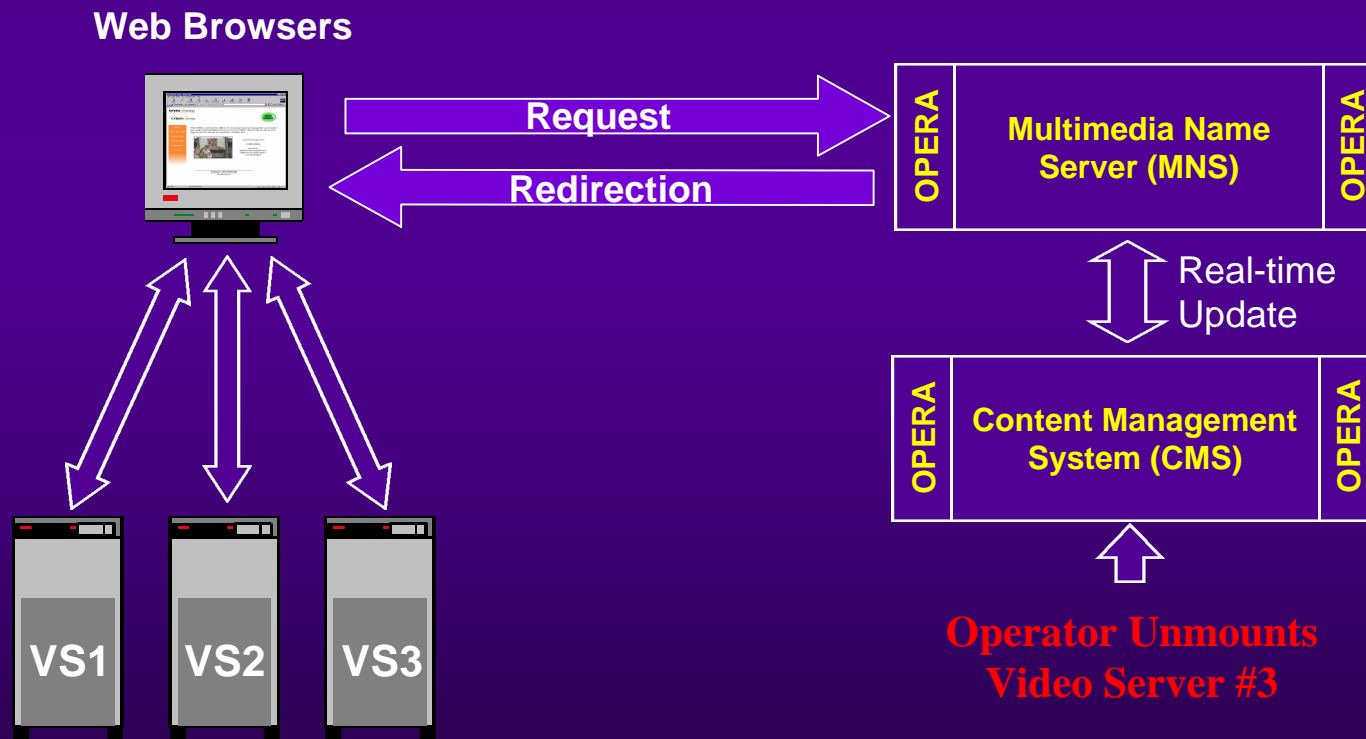
◆ Automated Content Management

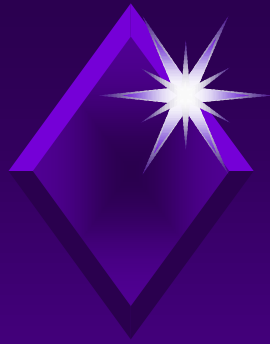




3. The OPERA Platform

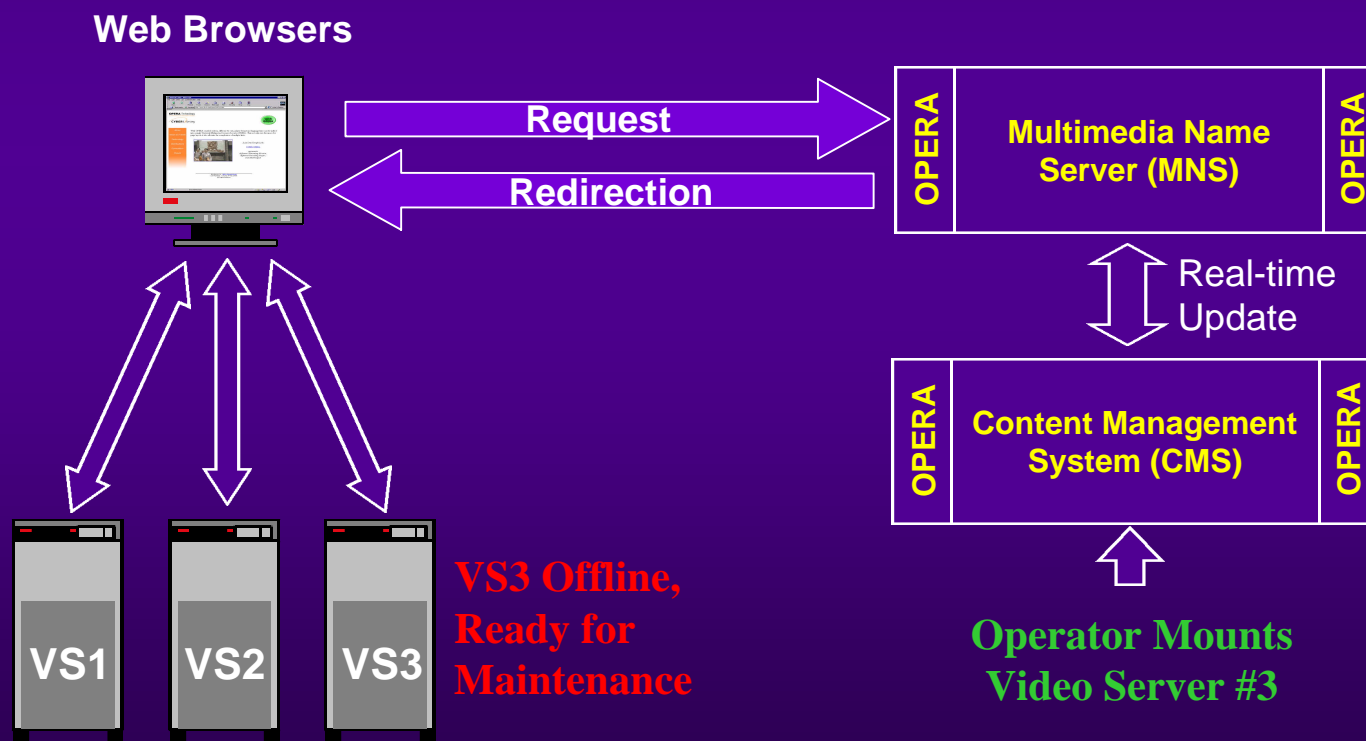
◆ Improved Server Maintenance

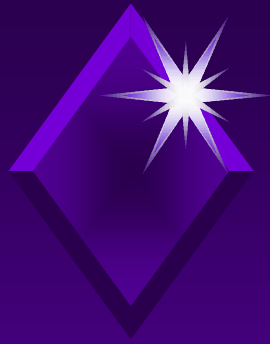




3. The OPERA Platform

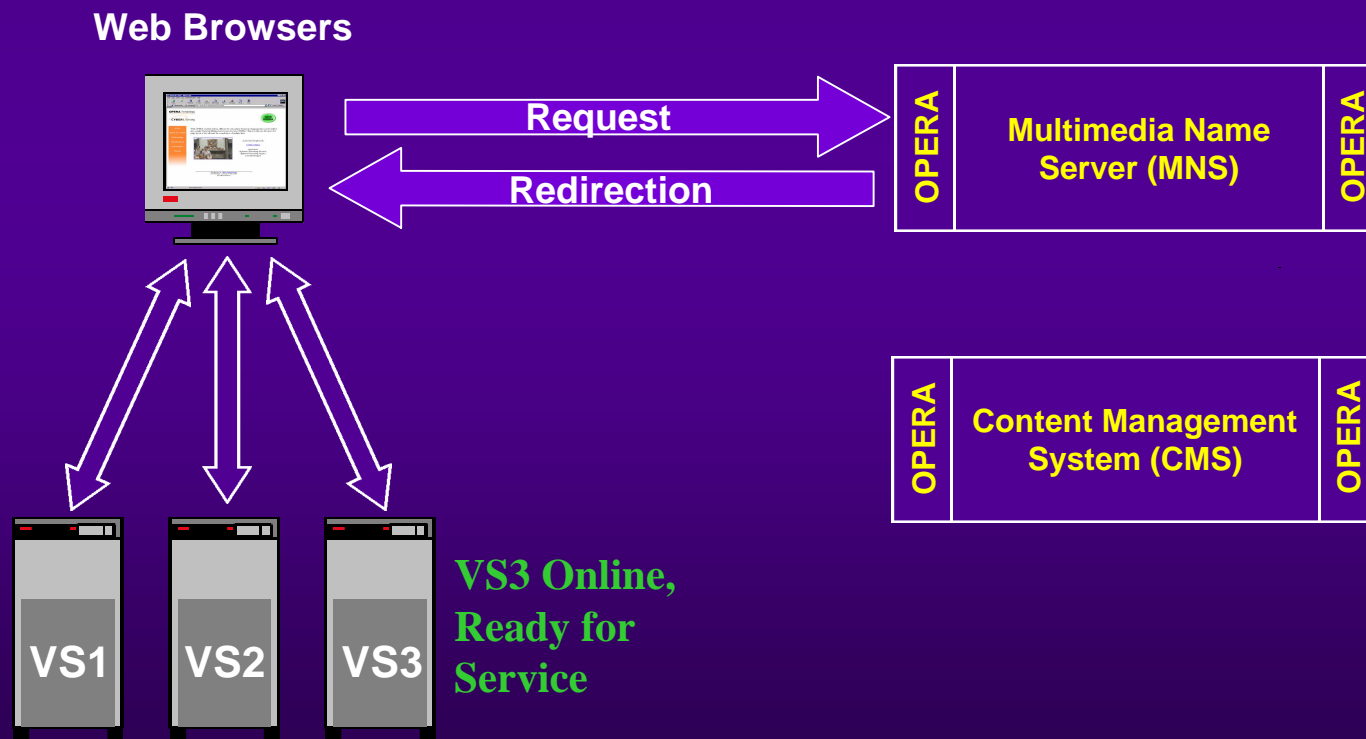
◆ Improved Server Maintenance

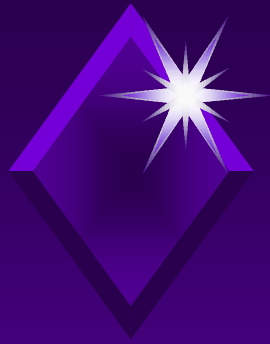




3. The OPERA Platform

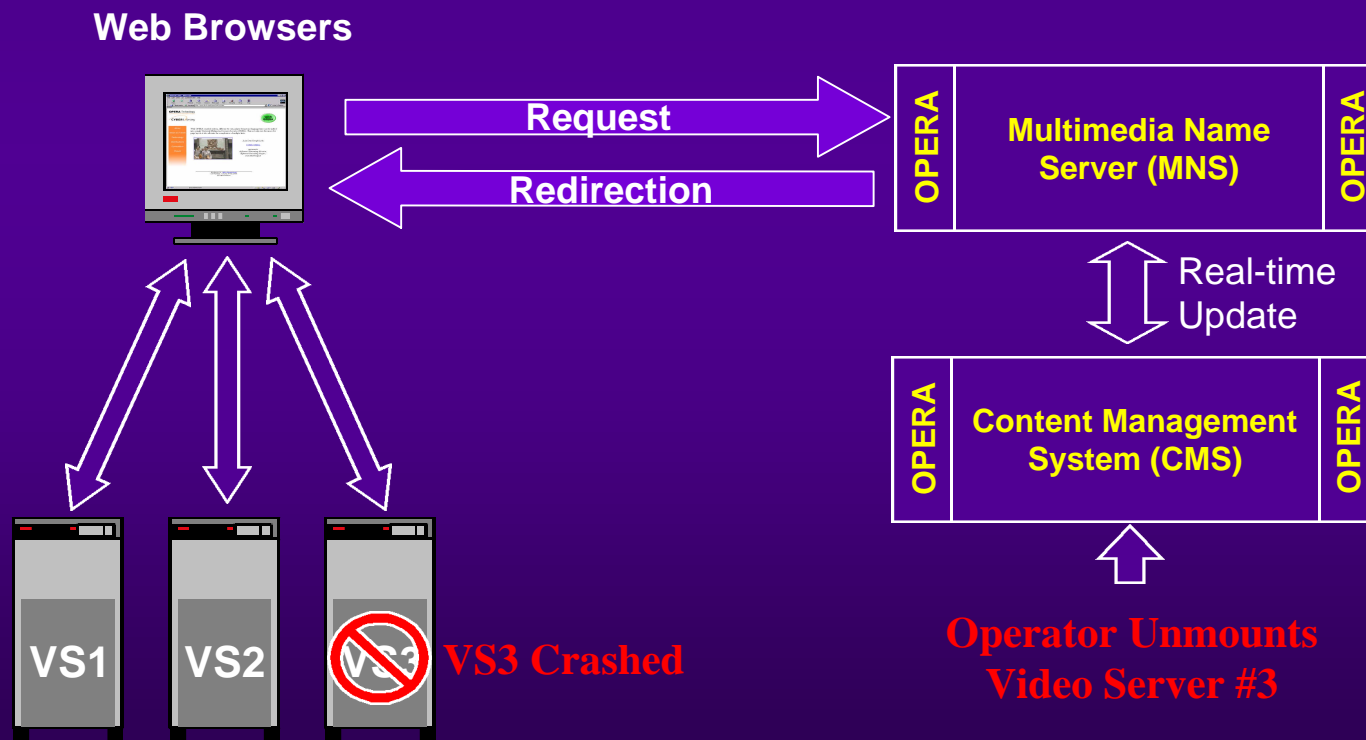
◆ Improved Server Maintenance





3. The OPERA Platform

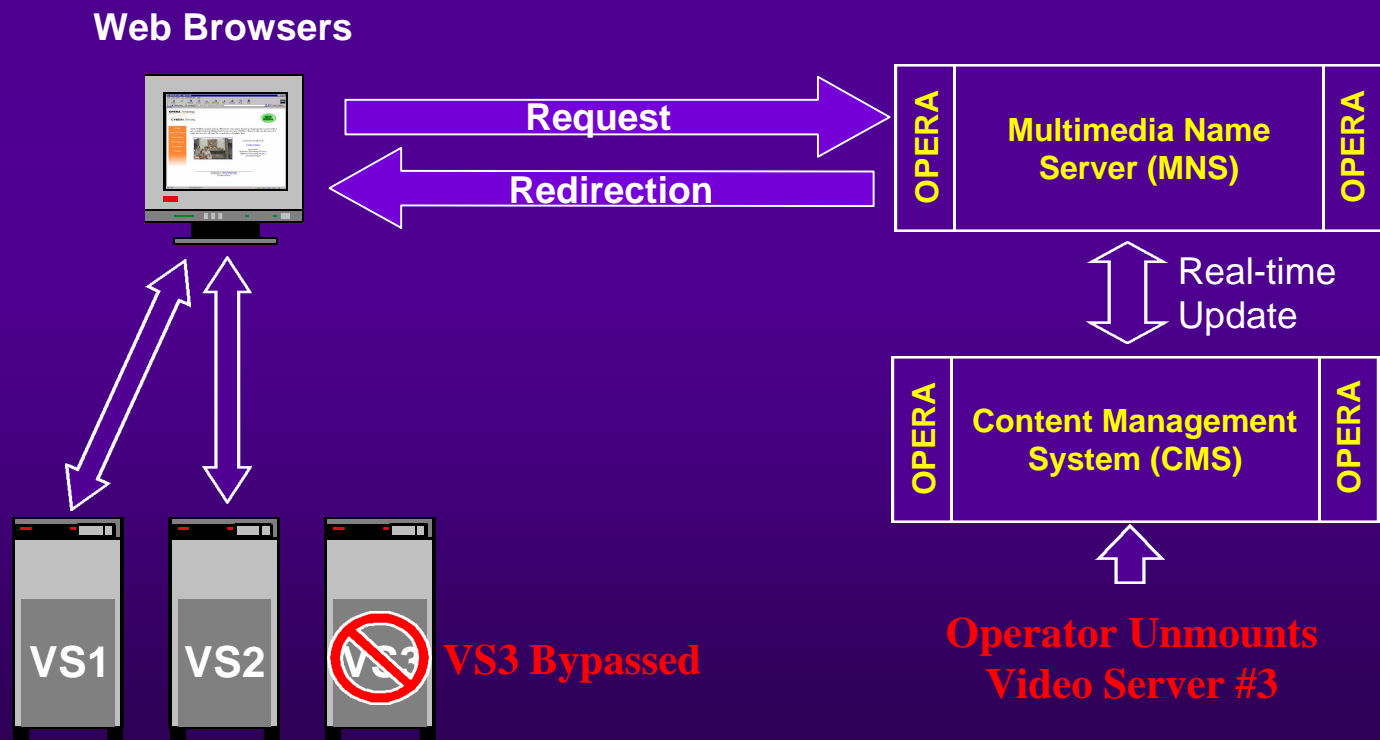
◆ Transparent Server Failover





3. The OPERA Platform

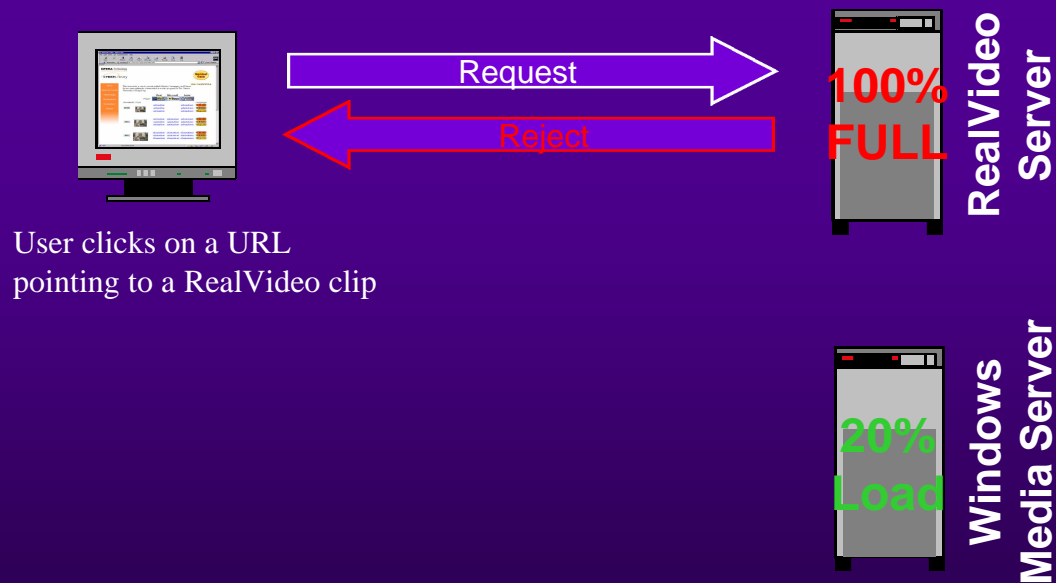
◆ Transparent Server Failover

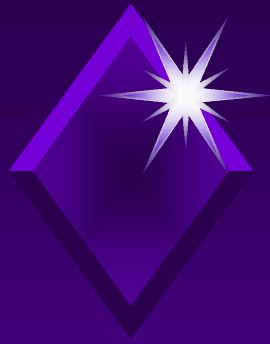




3. The OPERA Platform

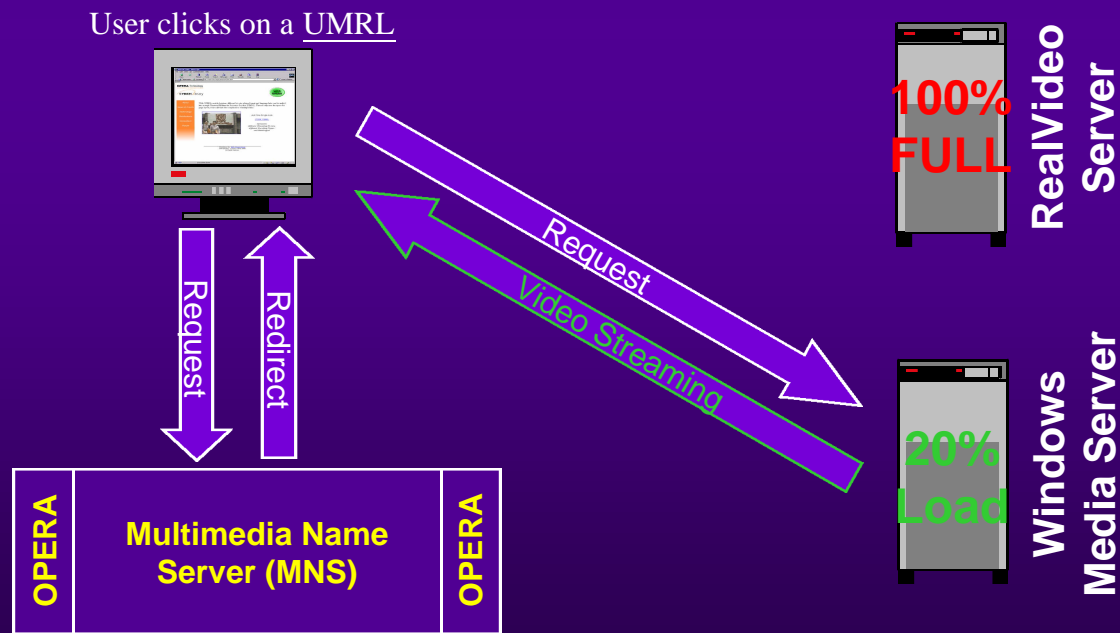
- ◆ Cross-Platform Load Balancing
 - ◆ Without OPERA:





3. The OPERA Platform

- ◆ Cross-Platform Load Balancing
 - ◆ With OPERA:

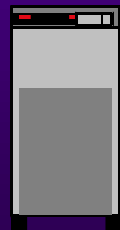




3. The OPERA Platform

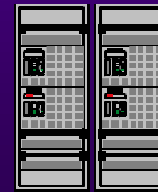
◆ Cross-Continent Redirection

USA-based User



US-based
Media Server

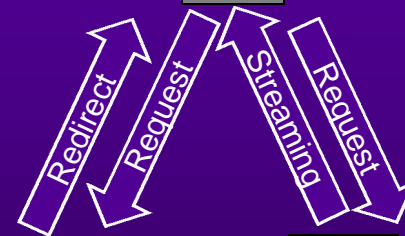
A user from Hongkong
clicks on a UMRL link

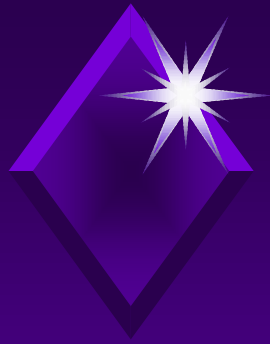


HK-based
OPERA MNS



HK-based
Media Server





3. The OPERA Platform

◆ Cross-Continent Redirection

A user from USA
clicks on the same UMRL link

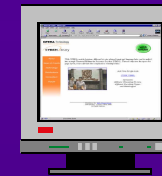


Request
Streaming

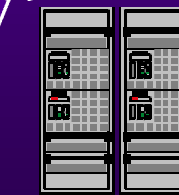
US-based
Media Server

Trans-Continental
Internet Link

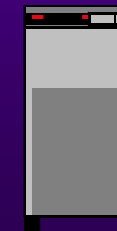
A user from Hongkong
clicks on a UMRL link



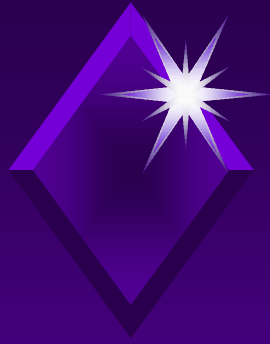
Request
Redirect to US-based Media Server



HK-based
OPERA MNS

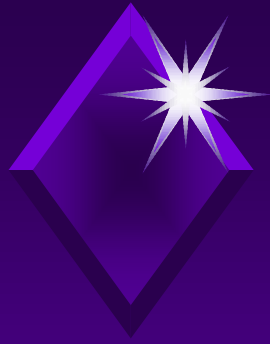


HK-based
Media Server



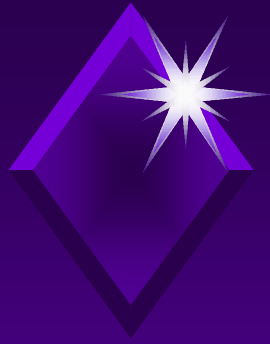
4. *OPERA Availability*

- ◆ Multimedia Name Server
 - ◆ Beta2 now available for Solaris platforms
 - ◆ Linux and Windows NT versions coming
- ◆ Content Management System
 - ◆ Java-based
 - ◆ Beta now available for Java-ready platforms
- ◆ Content Management Agent
 - ◆ Beta now available now for Windows
 - ◆ MacOS version coming



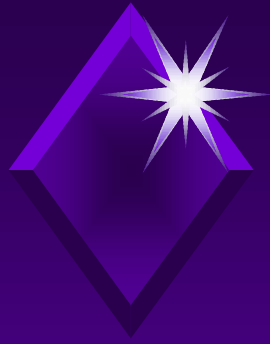
4. *OPERA Availability*

- ◆ Industrial Consortium
 - ◆ Access to Content Management Agent
 - ◆ Access to Multimedia Name Server
 - ◆ Access to Content Management System
 - ◆ Technical support and training



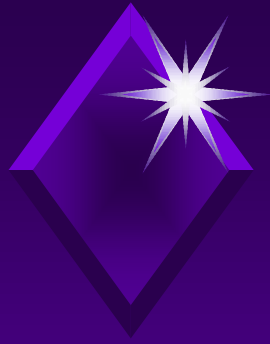
5. New Opportunities

- ◆ For Content Providers
 - ◆ Improves web interface
 - ◆ Contents appeal to broader audience
 - ◆ Increases market penetration
 - ◆ Reduces production cost
 - ◆ Simplifies web site maintenance
 - ◆ Personalized / customized contents



5. New Opportunities

- ◆ For Service Providers
 - ◆ Increase service values
 - ◆ Reduces operating costs
 - ◆ Reduces resource requirements
 - ◆ Improves equipment utilization
 - ◆ Improves service reliability
 - ◆ Simplifies system administration and maintenance



6. The Future

- ◆ Real-time Media Transcoding
- ◆ Automatic Server Failover
- ◆ Intelligent Media Replication
- ◆ Intelligent Server Bandwidth Management
- ◆ Intelligent Requests Routing