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# Differentiated Quality of Service through Quality Aware Transformation of Web Content

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## Goal: Dynamically customize multimedia objects to prevailing server, network and client characteristics

## Motivating Scenario

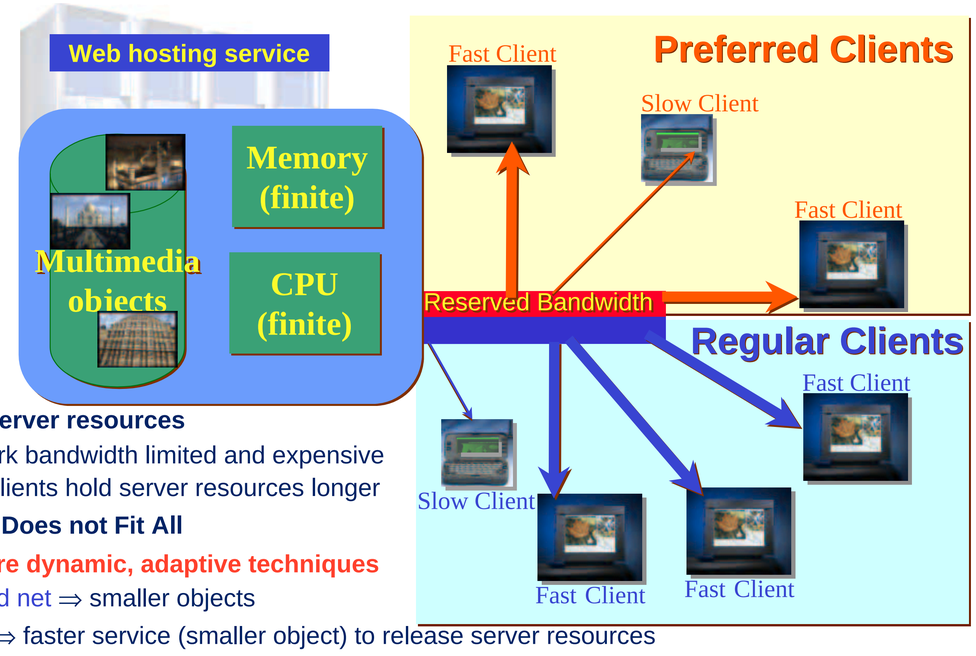
**Wide spread use of web multimedia objects**

**Proliferation of devices that can:**

- create (affordable scanners, digital cameras etc.)
- share (web, email, LAN, DSL, cable, cellular etc.)
- consume (PC, laptops, PDA etc.) multimedia objects

**Differentiated QoS based on client/net characteristics:**

- higher quality to preferred, paying customers
- flash crowds - control bandwidth consumption
- reasonable quality to impress potentials




**Limited server resources**

Network bandwidth limited and expensive

Slow clients hold server resources longer

**One Size Does not Fit All**

**Require dynamic, adaptive techniques**

Congested net ⇒ smaller objects

Slow net ⇒ faster service (smaller object) to release server resources

Paying customers ⇒ better quality (larger object)

## Roadmap

### 1. Informed transcoding

**Develop techniques to quantify trade-off characteristics**

- measure image information quality loss
- estimate CPU overhead
- estimate expected size gain

### 2. Customize multimedia using informed transcoding

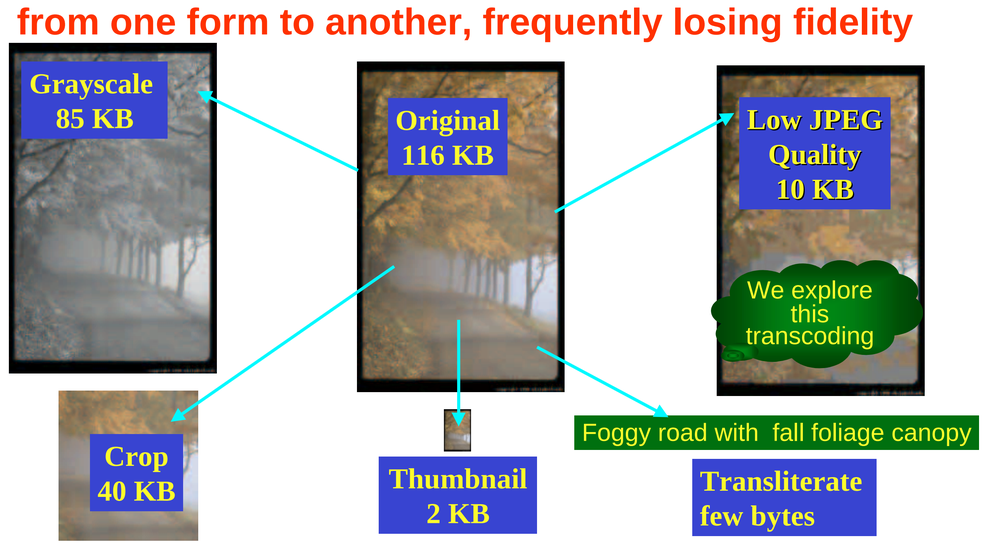
**Gracefully and dynamically degrade multimedia for**

- different user classes
- managing overall consumed bandwidth

**Avoid unnecessary transcodings**

## Informed Transcoding

**Transcoding is the transformation of a multimedia object from one form to another, frequently losing fidelity**

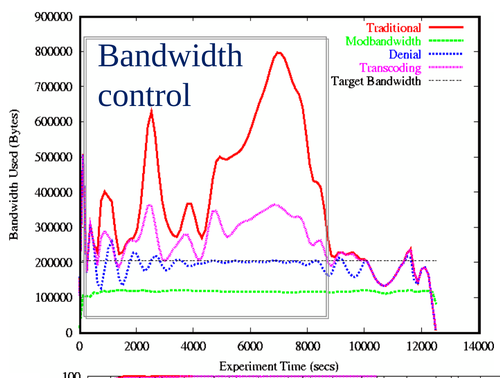


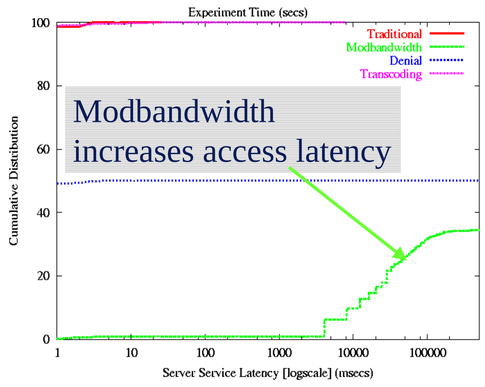

**Effective when lose less in quality than gain in space saving**

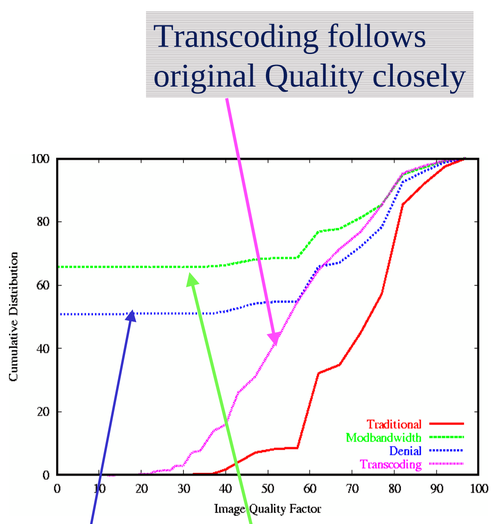
## Bandwidth control

(target - 400 KB/s)

- Modbandwidth controls bandwidth by throttling packets
- Denial sends ServiceDenied response to control bandwidth




## Differentiated QoS

(target - 1 MB/s; 400 KB/s for preferred clients)

- Traditional policy - Apache Web server. No QoS
- Denial policy - denies service for requests over bandwidth limit