Exploiting the Grid for Flexible Multimedia Transcoding and Content Delivery

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Content Distribution Networks (CDN) aim at providing data to users with high QoS.

Data are delivered from one of many hosts holding replicas:
- Multimedia contents have different formats
- A client player is able to decode only some specific formats

To satisfy clients requests, for each content, multiple formats could be published on a CDN, or the CDN could be enriched with means to perform on-the-fly transcoding of contents.

Exploiting the Grid

Grid Computing environments offer a huge amount of storage space and CPU power to perform on-the-fly adaptation of data in order to satisfy the QoS parameters requested by the user.

A software architecture is integrated with standard Grid middleware, that:
- Selects appropriate contents and hosts
- Takes into account the characteristics of contents and network

The Architecture

The content distribution architecture consists of:
- **CoT** (Content Tracer) finds the SE storing the user requested multimedia content
- **TraM** (Transcoder Monitor) traces the available Transcoders, i.e. those that can serve requests
- **CET** (Computing Element Tracer) monitors the load of CEs that can satisfy the computational needs (hardware, RAM)
- **TraS** (Transcoder Selector) chooses the most appropriate CE among those known by TraM and CET

Transcoder Startup

A Transcoder that starts executing:
- Communicates its location to a Transcoder Hub (THub)
- Measures the communication delay with Thub
- Asks the location of other Transcoders
- Measures the communication delay with other Transcoders
- Sends such measures to Thub
- Waits for an ‘initiation’ command to start content transcoding

Content Distribution

TraS strives to keep the network latencies at minimum, so as to minimise the response time.

Latencies are assumed proportional to the "distances" between:
1. SE storing the content and CE where the Transcoder runs, i.e. d(SE, CE), and
2. that CE and the user, i.e. d(CE, GI)

TraS determines the CE and SE that minimise the sum of the above distances using data from CoT, CET and THub