A Set of Metrics for Evaluation of Interactive News-on-Demand Systems

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- Abstract -

A key issue in any system for distribution of continuous media-on-demand is the capacity of the system with regard to quality of the service specifications, that is, the number of simultaneous streams the system can provide until degradation of quality of reproduction and interactivity perceived by the users. This work presents the evaluation of interactive video-on-demand systems, with special attention to limitations caused by the video server. The evaluation is based on a set of metrics designed to determine the number of streams a video server can support under specific requirements of quality of the service as perceived by the users. To validate the utility of these metrics, a prototype of a news-on-demand service has been built and the load for this kind of systems has been characterised. In addition, a load generator which emulates the concurrent access of several users to the system has been built. The evaluation establishes the relationship between the video server limitations and the quality of the service perceived by the users.

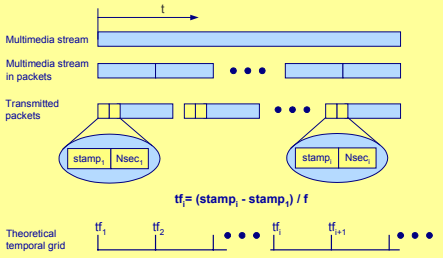
- Goals -

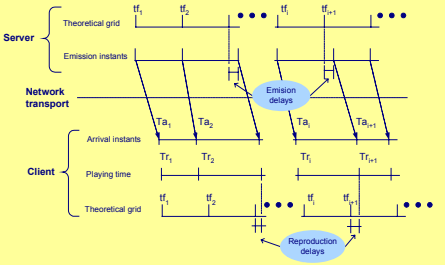
- ✓ **Design a set of metrics to measure the *quality of presentation* of streaming multimedia data**
- ✓ **Dimensioning the streaming server for a required *quality of the service***
- ✓ **Evaluate a low-cost solution for the streaming server**

- NoD Prototype -

- 50 news/day, 1 week
- News categories
  - ✓ **Short**: 30 s - 1m (06% of total)
  - ✓ **Medium**: 1 - 3:30 m (84% of total)
  - ✓ **Long**: 3:30 m - 1h (10% of total)
- Transmission speed
  - ✓ **Low**: < = 28 Kbps
  - ✓ **Medium**: 28 - 56 Kbps
  - ✓ **High**: > 56 Kbps
- Frame size is constant (176 x 144)
  - ✓ **Low quality**: 08 fps
  - ✓ **Medium quality**: 15 fps
  - ✓ **High quality**: 30 fps

- Streaming -



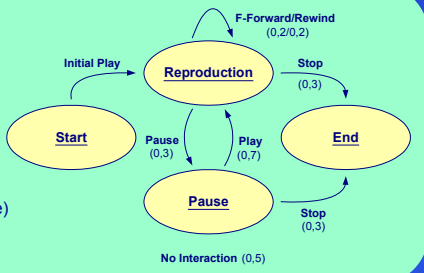


- Metrics -

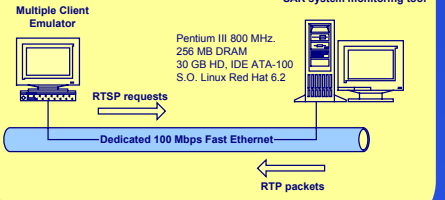
- Metrics of quality of reproduction
  - ✓ **Percentage of delayed packets**
  - ✓ **Mean packet delay**
  - ✓ **Percentage of packets lost**
- Metrics of quality of interactivity
  - ✓ **Mean start response time**
  - ✓ **Mean interaction response time**
- Metrics of server capacity
  - ✓ **Throughput** (streams served per hour)
  - ✓ **Resource utilization** (CPU, HD & NET)

- Workload -

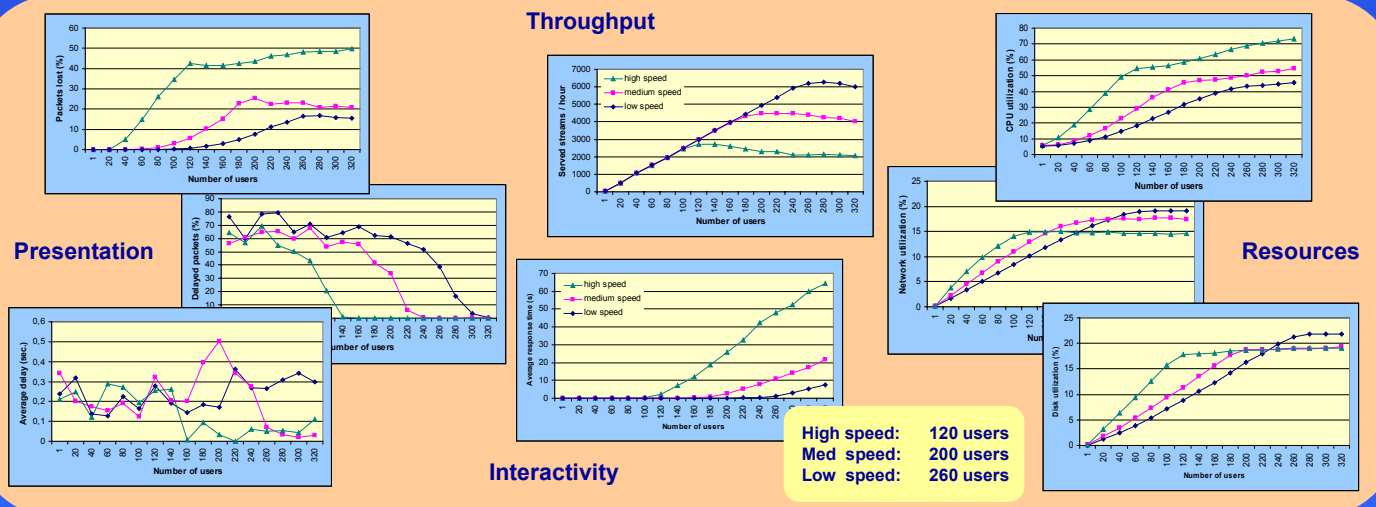
- ✓ An user can requests as much news as he wants
- ✓ News are choose randomly among all available
- ✓ An user always choose news from the same class quality
- ✓ An user can interact with the news
- ✓ 7 days of news in server (50 streams of 3 quality classes per day)
- ✓ Access probability to each peace of news driven by Zipf law:
  - ⇨ Access frequency is proportional to popularity
  - ⇨ The more recent the news, the greater its popularity
- ✓ Statistical distributions: Exponential (Plays and Thinking time)
  Weibull (Pause)
- ✓ User interactions and probabilities (see diagram)



- Experimentation -



- Results -



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