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NinSuna: Metadata-driven Media Delivery

Davy Van Deursen^{*}, Wim Van Lancker, Erik Mannens, and Rik Van de Walle

Ghent University – IBBT, ELIS – Multimedia Lab, Belgium
davy.vandeursen@ugent.be

1 Platform Overview

Today, delivery of multimedia content introduces a number of important challenges due to the growing amount of multimedia content on the one hand and the growing diversity in usage environments on the other hand. Furthermore, we need to deal with a growing amount of media formats used for compressing and packaging multimedia content.

In order to deal with such a heterogeneous multimedia landscape, we developed NinSuna [3], which is a fully integrated metadata-driven media delivery platform. Its basic design is inspired by the principles of XML-driven content adaptation techniques, while its final design and the implementation thereof are based on Semantic Web technologies such as the Resource Description Framework (RDF), Web Ontology Language (OWL), and SPARQL Protocol And RDF Query Language (SPARQL). Furthermore, a tight coupling exists between the design of the media delivery platform and a model for describing structural, content, and scalability information of media bitstreams, enabling a format-independent adaptation and packaging approach [1].

2 Features

Our media delivery platform is characterized by a number of features. First of all, the core software modules of the platform (i.e., selection, adaptation, and packaging of media bitstreams) are fully **independent of media formats** (i.e., both coding and delivery formats). Therefore, the platform is highly **extensible**, since new media formats can be added by means of plugins. Also, the different platform modules can be distributed over different machines, which makes the platform **scalable**.

NinSuna uses a central **multimedia ontology** which couples the served media resources with any available metadata. Hence, the metadata is stored into a fully **RDF-based storage backend** for descriptive metadata which is accessible through a SPARQL endpoint. Also, a number of **metadata parsers** are provided for importing and converting XML-based metadata to an enhanced

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RDF representation (e.g., NewsML) while parsers for other metadata schemes can be added as plugins.

The platform supports various forms of **content adaptation**: scenes or shots can be extracted from any media resource to facilitate fine-grained search queries, requested media fragments can be adapted depending on the scalability provisions in the media stream, and track combinations can be selected (e.g., audio/video stream selection based on bit rate). Further, the platform supports the most common **media delivery formats** on the Web: streaming media delivery through RTSP and RTMP, HTTP progressive download (MP4, Ogg, 3GPP, MPEG-2 TS), and HTTP Live streaming.

Finally, NinSuna is a server-side reference implementation of the **W3C Media Fragments URI 1.0** specification [2], which mission is to address media fragments on the Web using Uniform Resource Identifiers (URIs). Having global identifiers for arbitrary media fragments allows substantial benefits, including linking, bookmarking, caching, and indexing.

3 Demonstration

We built two front-end applications to demonstrate our media delivery platform. The first demonstration consists of a faceted browser facilitating the retrieval of news fragments¹. More specifically, media resources representing news broadcasts are annotated on a scene level, by using NewsML metadata serialized in RDF. Hence, we can use the faceted browsing paradigm to let the end-user obtain his/her desired news fragments. Once a news fragment is chosen, the selected media fragment is extracted, packaged, and sent to the client. Additionally, dynamic frame rate adaptations are demonstrated as well.

The second demonstration shows the interaction between NinSuna and Media Fragment 1.0 URIs². More specifically, we show which HTTP requests/responses are sent to/from our platform and how the user agents can visualize such media fragment URIs.

References

1. D. Van Deursen *et al.*: Format-independent and Metadata-driven Media Resource Adaptation using Semantic Web Technologies. *Multimedia Systems* 16(2), 85–104 (March 2010)
2. D. Van Deursen *et al.*: Implementing the Media Fragments URI Specification. In: 19th International Conference on World Wide Web, WWW 2010. pp. 1361–1364. Raleigh, North Carolina, USA (April 2010)
3. D. Van Deursen *et al.*: NinSuna: a Fully Integrated Platform for Format-independent Multimedia Content Adaptation and Delivery based on Semantic Web Technologies. *Multimedia Tools and Applications – Special Issue on Data Semantics for Multimedia Systems* 46(2-3), 371–398 (January 2010)

¹ Screen cast available at <http://ninsuna.elis.ugent.be/NinSunaFacets#demo>.

² Screen cast available at <http://ninsuna.elis.ugent.be/MediaFragmentsServer#screencast>.