Project Achievements

CELTIC Telecommunication Solutions

Distributed Networked Multimedia Platform

Kusanagi aimed at optimizing rendering, compression, streaming, and display technologies in order to provide efficient remote rendering solutions for 2D & 3D content. The applications addressed in the project are 3D gaming and 2D ultra high definition professional visualisation.

Main focus

Various remote rendering solutions already exist, but none of them is well suited to the high requirements of 3D gaming or Ultra-High Definition visualization: latency is a major problem in both cases and requires specific optimizations of the whole chain, from the rendering server to the display device. Another common goal is to use only "commercial off the shelf" (COTS) hardware instead of dedicated hardware, and concentrate the intelligence in optimized software or even firmware solutions.

Approach

To achieve its ambitious vision, the Kusanagi project has been driven by a strong consortium with extensive experience in R&D and industry leadership in blockbuster games, and solutions for networked visualization
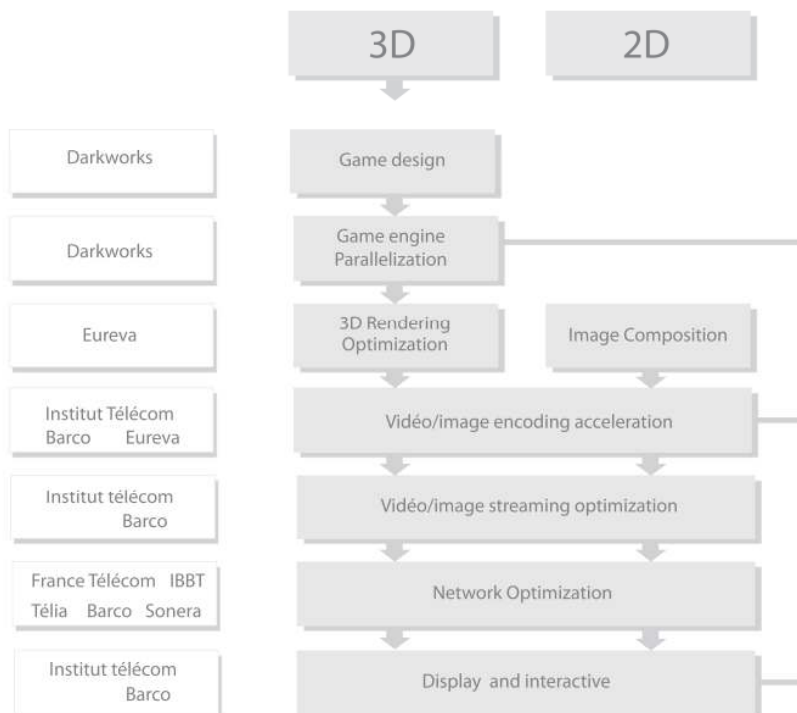
Kusanagi

Project ID: CP6-011

Start Date: 1 July 2009

Closure date: 29 January 2012

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intelligently combining universities, research institutions, large telecom and industrial companies, SMEs and startups. In the long run, The partners of the Kusanagi project wish to be a driver of the European video game and professional imaging industries and bring strategic and technical value, in conjunction with the move from consoles and terminals to networked remote desktops and gaming services.

The project focused on the evolution of software architectures that will be critical to master fields of highly parallelized processing, distributed processing, high bandwidth and low latency networks, and their intricate impact on content quality and speed of delivery, dataset size, optimization complexity, open infrastructure viability and production tools and middleware standardization efforts.

The specific aims of the Project were to conduct research and perform breakthroughs around the following core topics:

1. Image composition and rendering (optimisation, distribution and tools): Development of the base technology for a hardware independent rendering platform allowing efficient multi-core distribution

2. Multimedia Compression: Image/video compression processes were optimized, both from an algorithmic and an implementation standpoint

3. Streaming / Distribution: Emphasis has been put on protocol adaptability to network conditions and integration with rendering algorithms.

4. Network traffic characterization: Research on network traffic patterns and optimization possibilities and Quality of Service requirements when highly interactive HD content is streamed on very low latency networks.

Achieved results

Kusanagi has been built upon existing technologies, and every link of this chain had to be optimized to provide a superior gaming or professional imaging experience. The Kusanagi prototype thus integrates all the optimized software components developed during the project and is be able to compete with modern consoles and replaces existing professional visualization solutions.

An end-to-end seamless infrastructure has been realized to publish, play and interact in real time with High-Definition 2D and 3D Networked Multimedia Content. This platform manages multiplayer gaming and relies on open-source encoding and streaming architecture standards (MPEG4 format, lossless codecs). Optimizations for real time in changing network conditions like adaptive encoding and streaming according to network latency and bandwidth have been studied and implemented both for wire and wireless networks. The platform offers the best and stable user experience compatible with real-time interactions constraints. Moreover, hybrid encoding and display methods for very large 2D displays have been developed to completely cope with wireless situations or ultra high definition pictures.

Impact

The expected impact of the Kusanagi project is to allow the game and professional imaging industries to progressively move from local rendering solutions to remote rendering solutions. It enables real time visualizations' applications to be deployed in cloud infrastructures. In the gaming market, this means replacing consoles and physical data media by a game service accessed on a pay-per-use basis. In the professional imaging market, this means an increasing use of - possibly wireless- thin client devices with all computing resources in a central location.

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