ACDC - Adaptive Content Delivery Cluster

Co-Summit 2012

Special Edition

NEWSLETTER N° 3

As the ACDC project is ending in November 2012, the ITEA 2 Co-Summit 2012 is a perfect and right in time opportunity for presenting the results achieved during the last 2 years period of the project duration.

Can video distribution benefit from its services being available within a Cloud infrastructure?

Can semantic technologies help improving content delivery and user experience in video consumption?

As foreseen by several strategic analysis reports, Video traffic will represent in 2015 more than 50% of the global IT traffic.
So why not using cloud computing technologies (IaaS, Paas, SaaS), classically used for IT applications, to process, adapt, personalize and deliver multimedia contents.
Another guideline on top of this new approach is to use semantic technologies processed within cloud computing infrastructure in order to enable fast content search and recommendations.
ACDC project also allows introducing a new business model, which could be resumed by

"Pay as you go for what you use".

All the ACDC results are shown at ACDC project booth, thanks to the fourth use cases demonstrated, during the Co-Summit.

ACDC project demonstrators shown at ITEA 2 and ARTEMIS Co-summit 2012

Domain covered	Shown at Co-Summit 2012	Demonstration partners
Broadcast Content Delivery	Poster & Demo	BCE Basari Mobile TVN VTT
Non linear Content Delivery	Poster & Demo	Bull AGMLab IT ParisTech Kit Digital NDS Silkan University of Oulu
HbbTV Cloud services	Video	Sofia Digital Neusoft University of Oulu
Semantic gaming recommendations	Poster & Demo	VTT Tudor Sanoma University of Oulu

Summary of the 4 Demos presented at Co-Summit 2012

Demo 1
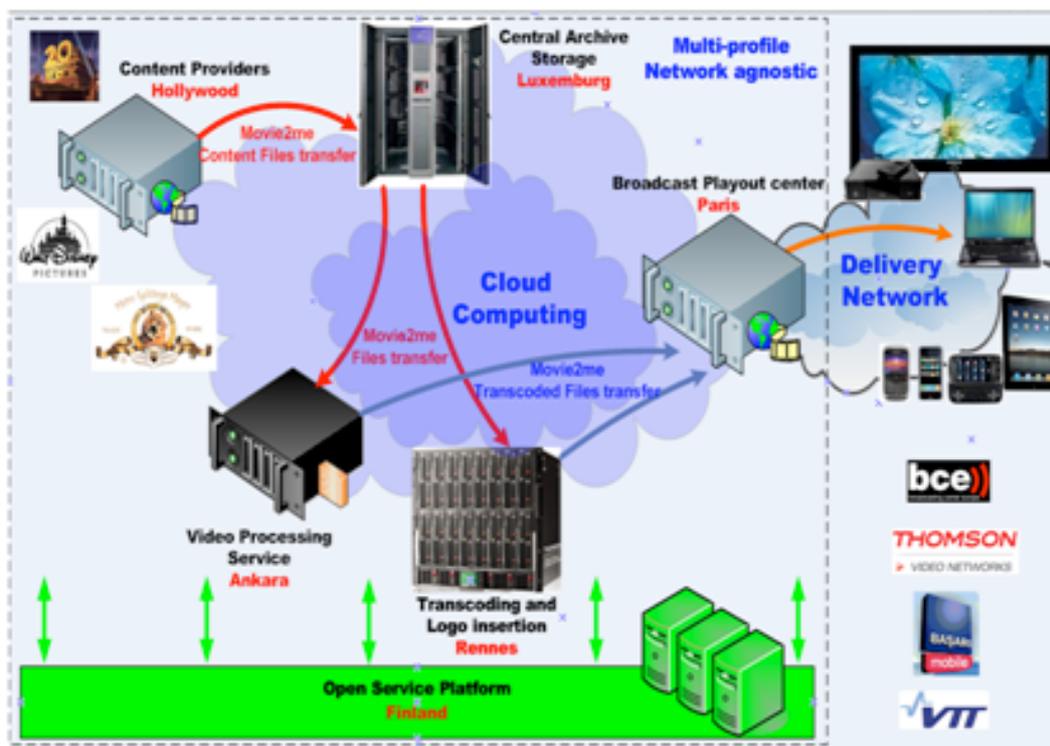
File based Broadcast Content Delivery

Context:

Broadcaster and Mobile/Telecom Operators are facing the challenge of delivering huge amount of contents to a rapidly growing number of multi-screen end-users devices.

Issues for Broadcaster and Mobile/Telecom Operators:

1. Decrease Costs

Improve :

2. Scalability - seamlessly add capacity to keep pace with growth
3. Elasticity - quickly adjust resources as demand fluctuates
4. Flexibility - accommodate multiple workflow scenarios

Answers:

- Decrease costs with "pay as you go" by progressively migrating capital investments to operational expenses (from CAPEX to OPEX). Broadcaster and Mobile/Telecom Operators use the ACDC shared cloud computing infrastructure in order to drive down their investments for local data centers equipment.
- Cloud answers to the Scalability issue by means of Cloud transcoding services. Cloud lets video suppliers scale seamlessly with market growth and ensure transcoding and storage capacity is always in line with demand.
- Cloud usage will improve Elasticity towards transcoding workload variations. Moreover, in case of unused capacity, the Service owner rents its remaining capacity as SAAS for other operators.

But also introduce a new performing delivery solution from Content Providers to Broadcaster and Mobile/Telecom Operators:

- In order to retrieve huge amount of video content worldwide at the lowest costs and securely using encryption, and as fast as possible, the implemented solution is a File based Broadcast Content Delivery named Movie2me within ACDC frame. Using this solution, contents providers ingest their material into the Cloud for Transcoding and Broadcaster and Mobile/Telecom Operators retrieve their expected content from the Cloud for personalization and final delivery.

Finally, due to the huge amount of contents - natives and multiple transcoded formats (different codecs , resolutions, rates, etc..), there is a new need to manage correctly all the numerous related metadata. The Open service platform contains available content list, both native and transcoded, search services as well as different file-based transcoding services available within ACDC cloud.

Demo 2
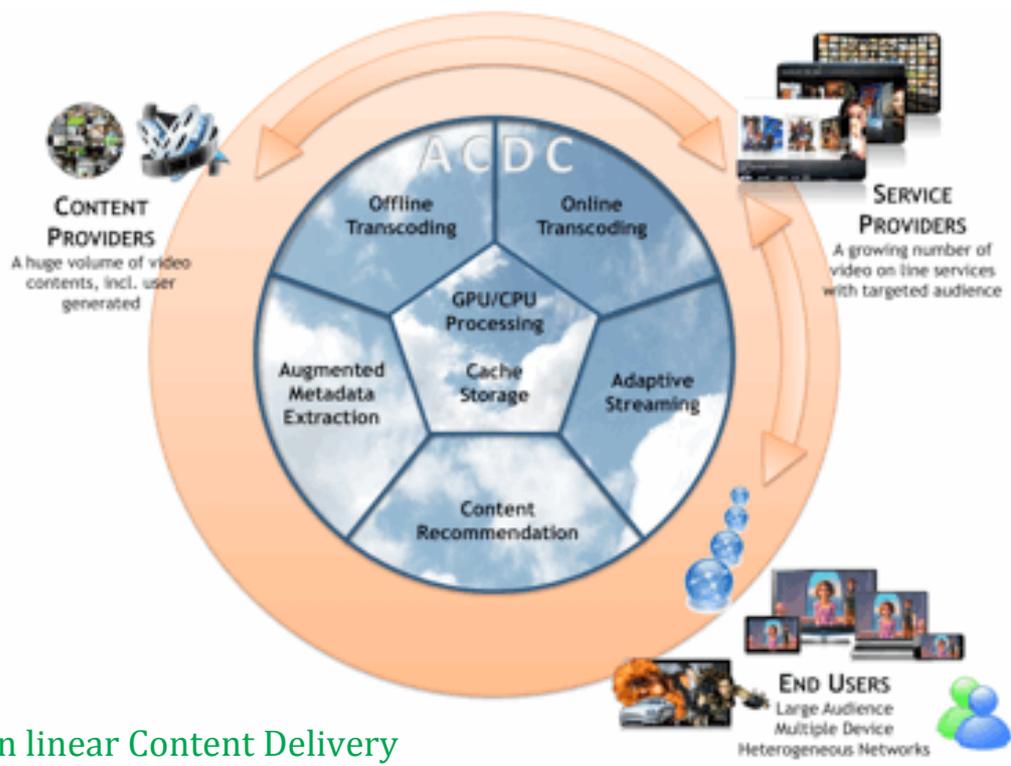
B2B2C Scenario: Non linear Content Delivery

The present scenario illustrates the *Adaptive Content Delivery Cluster* concept, with the Proof-of-Concept of a complete eco-system relying on a shared cloud infrastructure powering new-gen Media and Semantic Services.

Context:
Network & Service Operators are facing the challenge of delivering huge amount of contents to a rapidly growing number of end-users asking for video on multiscreen devices.

Issues for Service and CDN Operators:
1. *Cost decrease*
2. *Scalability - seamlessly add capacity to keep pace with growth*
3. *Elasticity - quickly adjust resources as demand fluctuates*
4. *Flexibility - accommodate multiple workflow scenarios and highly changing load*
5. *Efficiency – Content Delivery Network Operators have to deal with increasing video delivery volumes, implying increasing cost and bandwidth usage*

Answers:
A complete eco-system has been defined, providing multiple video services to the different actors of the video content delivery chain, from Content Providers to Service Providers and to the end-user:
- Adaptive Transcoding (on-the-fly & offline): adapt to user device, bandwidth
- Adaptive Streaming
- Metadata generation / extraction (augmented metadata)
- Recommendation engine
- Future ready 3D technology (multi-view displays)

This eco-system is built upon a dedicated Cloud infrastructure, powered by several technical service providers (SPs): On-The-Fly transcoding SP(s), Content Delivery & video streaming SP(s), offline transcoding SP(s), semantical content analysis SP(s), usage based recommendation SP(s), IaaS Cloud SP(s)

Typical use case:
- Content providers propose video content
- This content is then proposed to end-users by a Video Service Provider
- On demand, a specific video content is fetched and transcoded on-the-fly for first delivery
- Related Content is recommended, based on Semantic analysis of the displayed content
- Leveraging on unoccupied machines, this related content can be prepared by anticipation for video delivery, and transcoded in the used video format.

Achievements:
With this prototype we achieved significant objectives:

- Cost reduction – Cloud Open Source components (Hadoop, Openstack, CompatibleOne ..) & infrastructure mutualisation
- Elasticity & scalability – provided by a Saas approach based on Iaas Infrastructure
- High performance – optimised parallel algorithms and a distributed cache system

- Trustful deployment model - private / community Cloud located in Europe

The prototype has been elaborated by Bull (cloud infrastructure, OtF encoding & streaming), NDS (client application), KIT Digital (service provider application), Silkan (parallel content transcoding), AGMLab (recommendation engine), University of Oulu (semantical content analysis) and integrates VTT's Cam4Home database as metadata repository.

As a conclusion

This prototype shows the integration of video delivery services within a cloud infrastructure, permitting costs reduction with "pay as you go" model by progressively migrating capital investments to operational expenses (from CAPEX to OPEX). This facilitates the emergence of new service operators by providing a more flexible cost model, with a lower initial CAPEX need.

Demo 3
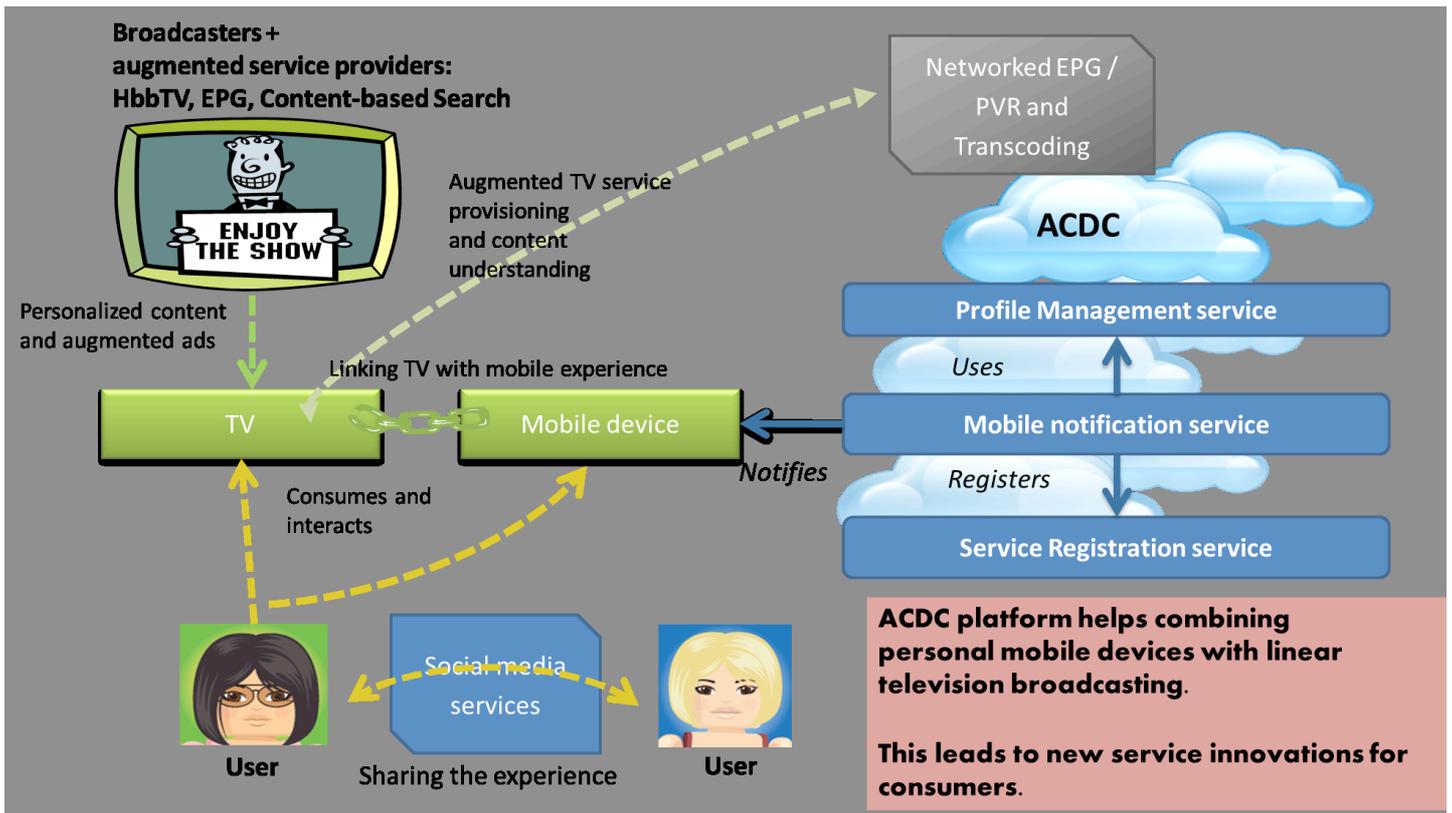
Smart HbbTV Service with Cross-device Mobile Notifications and Advertisements

Issues for Service providers:

Demonstrate how additional cloud based services and advertising can be provided to the end user using the HbbTV platform

Context:

•Augmented EPG deployed into cloud enables additional user awarness content based program information and program recommendation based on content similarities

•Personalized cloud based notification service to mobile devices

•Scalable and dynamic promotional cross-device campaigning from broadcasters to viewers

Answers:

Following advantages of cloud based computing for HbbTV services has been recognized but not implemented in this demo

•Video content transcoding, adaptive streaming and delivery for cross platforms deployment

•Scalable network PVR storage for TV programs

•Linking user profile with social media service

Demo 4
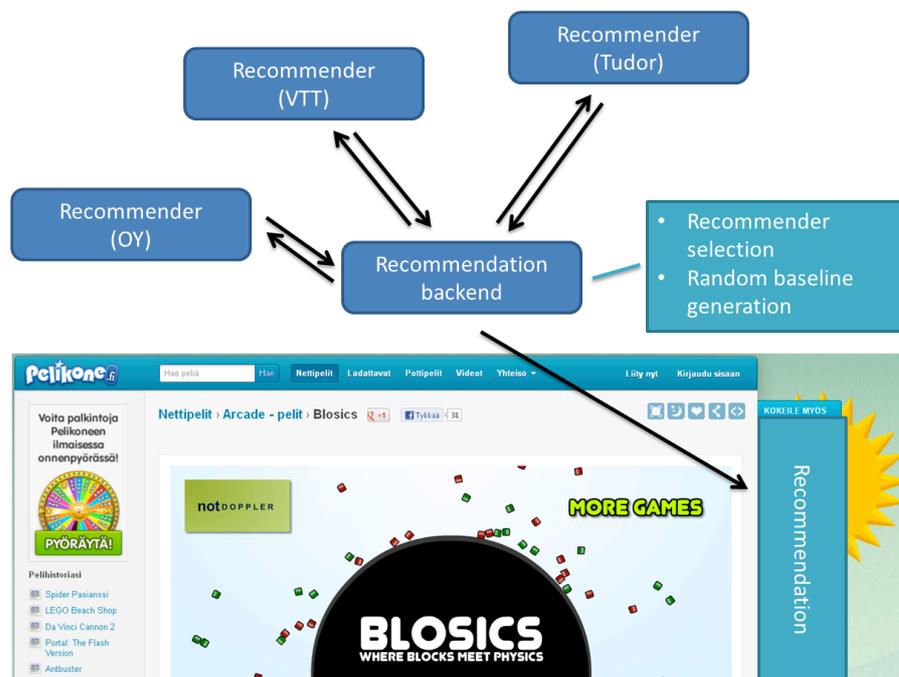
Semantic Recommendations for Web Gaming

The demo implements an on-line trial which illustrates the ACDC project concept "adaptive content delivery cluster", relying on "intensive use of Semantic Technologies". The goal is to compare different "Recommenders" (semantic recommendation algorithms) for web games, which try to maximise player gaming satisfaction, and thus to extend the duration of its online gaming, and to measure results.

Context:
Semantic metadata management and real time recommendation based on semantic metadata is demanding for the processing environment. Providing the services for end-users reliably without delay for growing number of end-users is a challenge for the content providers.

Issues for content providers:
1. Processing cost management

2. Scalability and elasticity

3. Real time requirements from end-user point of view

4. Absolute reliability requirement

5. Real time tracking of user behaviour for gathering data for user profiling

Achievements:
- Cloud based semantic metadata management and user tracking

- Client side integration of separate cloud-based services through cloud-based frontend service

- Field trials with scientific statistical data of different recommender approaches and their performance

- Real time semantic recommendations, guaranteed

Conclusion:
Using cloud infrastructure makes semantic metadata management and recommendations possible in real time with strict requirements for performance and availability. Also several months of live field trials with real user base shows that the integration to the cloud can be made reliably in real-time in the client side. During the live trials the different recommenders' efficiency was evaluated statistically.

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