Cloud computing for authoring process automation

Malinka Ivanovā *, George Ivanovb

aTechnical University – Sofia, College of Energetics and Electronics, Blvd. Kl. Ohridski 8, Sofia 1000, Bulgaria
bMathematical and Science High School, Maritza Str. 4, Blagoevgrad 2700, Bulgaria

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Abstract

The paper explores the possibilities for automation of the authoring process in the Web 2.0 platform. The cloud computing strategy that incorporates various computer technologies is discussed from the point of view of the educators/authors. The authoring process as the sequence of actions that the authors perform utilizing applications and services in order to build a complete teaching/learning environment is examined and a model of the authoring process occurring in the cloud of Web 2.0 applications and services is developed. The created model is verified in the content authoring of the Computer Graphics course for students’ bachelor degree.

Keywords: Cloud computing; authoring process; automation; Web 2.0; mashup.

1. Introduction

Cloud computing has emerged as an important factor of extending computing infrastructures and educational computing needs. The term includes both the applications delivered as services over the Internet and the hardware and systems software in the datacenters that provide those services (Armbrust et al, 2009). Another definition is given in (Cloud Computing, retrieved 2009): Cloud computing uses the Internet and central remote servers to maintain data and applications. It is broken down into three segments: “applications”, “platforms”, and “infrastructure”. The cloud is the term for networked computers that distribute processing power, applications, and large systems among many machines. Applications like Flickr, Google, YouTube, and many others use the cloud as their platform, in the way that programs on a desktop computer use that single computer as a platform (Johnson et al, 2009).

The concept of cloud computing offers the educational sector a way to increase IT capacity and add on the fly capabilities without investing in new infrastructure, new training, or licensing new software. There is no need to setup, configure and manage large physical installations of hardware and networks. This technology allows much more efficient computing by centralizing storage, memory, processing and bandwidth. It reduces/eliminates problems associated with software version installation, control and updates.
It can be said that cloud computing offers a virtualization of strategies, events and processes. It gives many benefits and innovative opportunities to authors of content related to teaching/learning: (1) it provides expanding opportunities for resource creation and dynamic combination, (2) for sharing and transferring resources between management systems (LMS, LCMS) (with permissions granted), (3) for achieving greater experimentation and agile applications usage, (4) for increasing the possibility for participation and contribution among systems and applications, (5) for achieving efficiency, high utilization, and productivity (DeCoufle, 2009).

As seen, the concept of cloud computing incorporates various computer technologies, including web infrastructure, software as a service (SaaS), Web 2.0 and other emerging technologies. This term has different perspectives given by users and developers. From the point of view of the educators/authors, the cloud computing service moves the application software for content authoring from desktops to the cloud side. This is a good opportunity for authors who are able to plug-in anytime from anywhere and utilize a wide variety of applications/services from the cloud to automate their authoring process.

In this paper the features of cloud computing are examined in context of the facilitation of the performance of authoring tasks. The specific characteristics of Web 2.0 are explored and discussed according to their influence on the authoring process. The experience gained through utilizing several authoring tools from a cloud for supporting the automation of course content creation and management is presented and analyzed.

2. Web 2.0 Specification and Authoring 2.0

Web 2.0 is built around emergent technologies, applications and users’ added value. Everybody can produce, vote, syndicate, mashup, and comment content. The authoring process occurs in the cloud of Web 2.0 applications and it is affected by specific characteristics related to the new nature of web that are analyzed bellow.

By Authoring 2.0 we mean the process of content creation in interactive and collaborative way utilizing Web 2.0 applications and services and their remixing from various sources for building a learning/teaching environment.

Read/write web. The web is changing from a static to a more dynamic, interactive, and social place, where educators and students can be active content contributors. It is a cause for social interactions and discourses that are bases for an iterative collaborative authoring process. Instead of just being a one way source of information where information is consumed, the web now allows educators to have conversations about that data and information, and to then create new content or to improve existing. The state of students has changed too and they have become productive media authors and to add value to the participated course. Web sites are reaching out to the educators and inviting them to add content directly. Wikis, Blogs, Forums, and Content Management Systems are making this possible.

Networked web. The social network approach holds that the behavior of an individual is affected by the kinds of relations, or technical ties, and networks more than by the norms and attributes that an individual possesses (Yang, 2003). Recently, many web sites benefit from a network effect: the number of contributions grows, more educators and students turn to it as a source of information, the quality of information on the website improves and the authoring process is transparent. A wide range of social networks are formed building online communities of educators, researchers, students who share and examine the common interests and/or activities. The networked web influences on the performance of authoring tasks of both educators and students (Sparrowe et al, 2001).

Personalized Web. Personalization involves using technology to accommodate the differences between individuals. Web personalization is defined like a strategy that requires implicitly or explicitly collecting user information and leveraging that knowledge in the content delivery framework to manipulate what information to present and how to present it (Ricci, 2004). The implicit personalization is performed by the web page based on the different services: presentation agents, tracking and profiling services, notification services. With explicit personalization, the web page is changed by the author using the features provided by the system: look-and-feel view, user-defined color palette, columns number, configurable components, and panel extension. Hybrid personalization combines the above two approaches.

Personalization technologies put the student in the center of an interaction, application or service while ensuring that her/his experiences remain consistent and coherent across activities, devices, services, locations and networks. So, the author can personalize the content to best match a student’s preferences and needs, can personalize service to adapt according to the student’s goals related to context, can personalize the student’s interactions to enhance his/her experiences with applications and services.
Mashable web. The web is mashable allowing a combination of separate, stand-alone technologies into a novel application or service. Several colleges and universities have developed mashups for administrative, informational and educational purposes. New authoring tools are developed that enable non-technical authors to create sophisticated products without programming. Educators develop custom mashups to illustrate concepts as they teach; students include them in reports and assignments. The power of mashups for education lies in the way they help new conclusions reaching or new relationships discerning by uniting large amounts of data in a manageable way (The 2008 Horizon Report, 2008).

Visual web. Visualization is essentially a mapping process from computer representations to perceptual representations, choosing encoding techniques to maximize human understanding and communication. The goal of an educator might be visualizing phenomena or concepts for the student’s deeper understanding and thinking stimulation (ACM SIGGRAPH, retrieved 2009). Web 2.0 technologies propose not only static visualization tools: for diagrams creation, but also dynamics when the graphical elements being displayed can change with time: simulations, visual search engines, timelines, tools for organization of personal notes, plans, and ideas. Educators can present in an interactive way knowledge gathering and exploring.

Semantic web. There are three main views of the term semantic web: the vision, the program and the technology. According to (Matthews, 2005) about the vision of semantic web it is an extension of the current Web in which information is given well-defined meaning, better enabling computers and people to work in cooperation. There are several applications of which authors can take advantage: from web browsing to research to blogging to collaboration, such applications provide a taste of what may be on the horizon with the semantic web in education (Matthews et al, 2001).

RSS syndicated web. RSS (Real Simple Syndication) technology allows an aggregator to check the subscribed feeds and to collect all the new content from many sites. The educator can create feeds about any topic, can make a syndicated feed of search results of Google News, for example or can syndicate the Internet bookmarks. RSS feeds can be blended in one for creating groups of feeds (http://www.blogdigger.com) and in this way published on a web site. Students can arrange individualized, syndicated web pages creating large repositories of knowledge that all subscribers can benefit from. RSS can be a powerful research tool aiding educators and students in performing in depth research both individually and collaboratively by sharing and combining feeds across various sources, also allows for a more collaborative learning environment and enhances communication development, creating new networks of knowledge (Glotzbach et al, 2008).

Virtual web. The flat 2D web is replaced by an immersive and highly social 3D online world. The teaching/learning process is translated in virtual worlds such as There, Entropia Universe, and Second Life. Educators and students via avatars can interact among themselves and with media objects. Different educational strategies can be realized: for individual, group, collaborative work, for experiments, simulations and research, for university students, life-long or self-paced learners.

Other examples include Google Earth and Microsoft's Virtual Earth 3-D, where the learner can transcend the map layout and zoom into satellite-mapped locations around the world. Educators have excellent possibilities and tools for authoring of flexible and attractive teaching/learning environment, automating the objects generation, publishing and presenting.

Augmented web. Unlike virtual reality, augmented reality does not create a simulation of reality. Instead, it takes a real object or space as the foundation and incorporates technologies that add contextual data to deepen a person’s understanding of the subject. Augmented reality might add audio commentary, location data, historical context, or other forms of content that can make a user’s experience of a thing or a place more meaningful (Educause Learning Initiative, retrieved 2009). It is applied in experimental and location-based learning by combining technology familiar to students with locations that students see as their own (Rogers et al, 2002). Most of the augmented reality software such as ARToolKit is for programmers that can easily develop of a wide range of Augmented Reality applications. It can be used to calculate camera position and orientation relative to physical markers in real time.

Open web. On the web the educational materials of many open courses are shared for reusage in concrete context with minimal restrictions. Youtube video, twitter links and shared resources, podcast programs. The main purpose is the broadest possible dissemination of knowledge, in keeping with academic tradition. Open software and open code is widely adopted in education too, because of the possibilities for modification, integration, no restriction on other software, technology neutrality, license policy.
3. Automated authoring process in Web 2.0 Cloud

The authoring process is the sequence of actions that the author performs utilizing applications and services in order to build a complete teaching/learning environment. As it is seen the current web offers new creative possibilities for dynamic, author-driven development and delivery of content. Many Web 2.0 online applications give a possibility for automated and maintained the content creation. Here are presented several techniques that automate and facilitate content authoring:

1. **Templates usage.** Wizards or templates allow the fast creation of unique content and automatic publishing. This approach allows the author to control the automatic content generation and to format multiple application pages with little or no hand-crafting.

2. **Generation of embed code.** Created, uploaded and edited content through Web 2.0 applications can be converted into embed code that can easily be integrated in other applications and sites. For example, RSS Feeds can be converted into JavaScript code that can be incorporated into Web Pages. YouTube, Slideshare, Glogster generate code that can be placed in HTML script. Such automated function gives huge possibilities for authors to create a flexible, extendable mashup learning/teaching environment according to the subject domain.

3. **Different media format conversion.** The automatic conversion from one media format to another is a function of several Web 2.0 applications that support the author in the easy distribution of created content and also its integration in a wide range of media environments on different platforms, including PDA and mobile versions.

4. **Sharing function.** Developed content can be shared, voted and favorite. Functions for sharing automate the publishing process in different media sites such as: Facebook, Twitter, Digg and so on.

5. **Automatic tag generation.** Social tags are author-generated keywords associated with some resource on the Web. They have become an important component of content searching and folksonomy forming. There are different algorithms to generate personalized annotation tags for Web pages by exploiting document similarity and keyword extraction. The tags can be automatically created, applied and dynamically shared.

6. **Localization.** Demand for localization of blogs, RSS feeds, Wiki and knowledge bases is increasing in the age of Web 2.0. In many social applications the translators can be integrated and content can be globally accessible.

The above presented Web 2.0 features are discussed and analyzed from the author’s perspective and they are bases for the development of an authoring process model in a cloud of Web 2.0 application and services that is presented in Figure1.
4. Utilized Web 2.0 Applications for Authoring in Edu 2.0

A Learning Management System based on Web 2.0 technologies Edu 2.0 is used as an environment for organizing a teaching/learning of a Computer Graphics course. The authoring features of Edu 2.0 allows the creation of HTML pages with a wide variety of integrated media objects as well as embedding of code generated in outside Web 2.0 applications. The authors are educators as well as students. The embedded social learning objects come from YouTube in the form of video, from SlideShare as PowerPoint presentations, from Scribd as Word documents, from Glogster as interactive posters, from ScreenToaster in the form of screen recording with audio, from PollDaddy as polls and surveys. Another part of the content in the course is presented through RSS feeds with recent and actual information in the subject domain. Several widgets are empowered to add interactivity and event synchronization in real time like Twitter and Flickr updates, TV widget, delicious bookmarks widget. The Wiki in Edu 2.0 facilitates the collaborative authoring among course members, who are encouraged to edit content posted by other educators and students and to create new pages to improve the content of the course. The course blog is started to promote writing and reading habits and also to provide new channels of information and knowledge. The authoring process in Edu 2.0 and beyond is shown in Figure 2.

5. Conclusion

The authoring process in a cloud of Web 2.0 applications can be described as: creative, iterative, bottom-up, virtual, and collaborative process, giving educators and students powerful functions for automation of content production, remixing, conversion and publishing. The model of Authoring 2.0 is developed and it is verified at building of Computer Graphics course. The authoring functions of Learning Management System Edu 2.0 are examined as well as Edu 2.0 extendible and mashable environment is used as a framework for adoption the results from a large massive of Web 2.0 applications and services.

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