

Reusable collections of web-based program animations

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Reusable Collections of Web-Based Program Animations

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Categories and Subject Descriptors

K.3.1 [Computer Uses in Education]: Computer-assisted instruction (CAI); K.3.2 [Computer and Information Science Education]: Computer science education

General Terms

Algorithms, Documentation, Human Factors.

Keywords

Program animation, web-based animations, web-based educational resources, reuse, collections of animations.

Program animations have been used for teaching computer programming since the birth of the field in the eighties. If the designer of animations wants to make them universally available in the classroom, the laboratories and at home, a web-based approach will probably be adopted. To foster the use of program animations by teachers, animations must also be easy to generate and use. This demonstration illustrates an effortless approach to building and managing reusable web-based program animations using the WinHIPE integrated programming environment (IDE).

WinHIPE allowed building web-based program animations. They consisted of four parts: problem statement, algorithm description, program, and the program animation itself. However, these animations are difficult to reuse because they are stored in a proprietary format, and the IDE does not allow the user to reload an animation to modify it.

To enhance the effortless construction and maintenance of web-based program animations, as well as their usability, we have made three major changes in: the information stored within animations, the building process and their graphic design.

The contents of web animations have been modified to support maintenance. It now consists of: (i) a textual part where the title, problem statement and algorithm description are given; (ii) an animation part where all the data necessary to play and manage the animation is stored; and (iii) a look part with style information about the web pages. Each part has two types of information: maintenance information (encoded with an XML language) and visible information (CSS-HTML code).

The process to build a web program animation is a simple extension of the effortless “edition-compilation-execution-snapshot selection” process used in WinHIPE. With a simple user interface, the user only has to provide the title, the problem and algorithm descriptions, as well as style information. Afterwards, an XSL transformation is applied and the web animation is generated (see Figure 1).

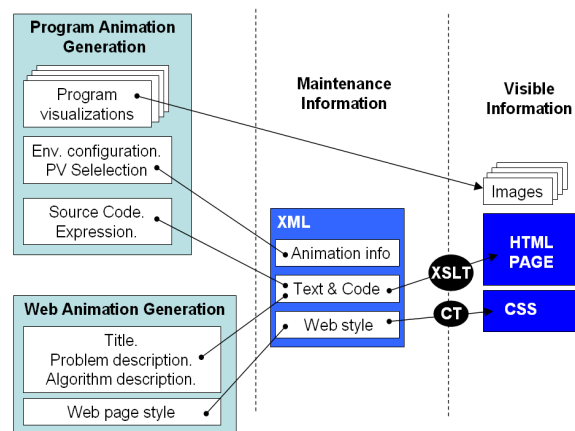


Figure 1. The building process

We also have developed three new formats to view animations. As a result, the IDE provides the user with cross-platform independence, usability and adaptability to his/her preferences.

A teacher will typically build more than one animation. Thus, we have also extended the IDE support to assist the teacher in organizing and modifying collections of animations. A collection is managed as a hierarchical structure organized into categories, with animations associated to them. Thus, the teacher can adapt the collection to his/her needs by creating and modifying this structure; inserting, moving and deleting animations; associating style information to categories instead of individual animations; and even building new collections by extracting categories from other existing collections. A collection of animations is implemented with XML, therefore its publication will simply be the result of applying an XSL transformation.

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