artEoz - dynamic program visualization

Martine Gautier, Brigitte Wrobel-Dautcourt

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Martine Gautier (martine.gautier@loria.fr)
Brigitte Wrobel-Dautcourt (brigitte.wrobel-dautcourt@loria.fr)
Université de Lorraine - France

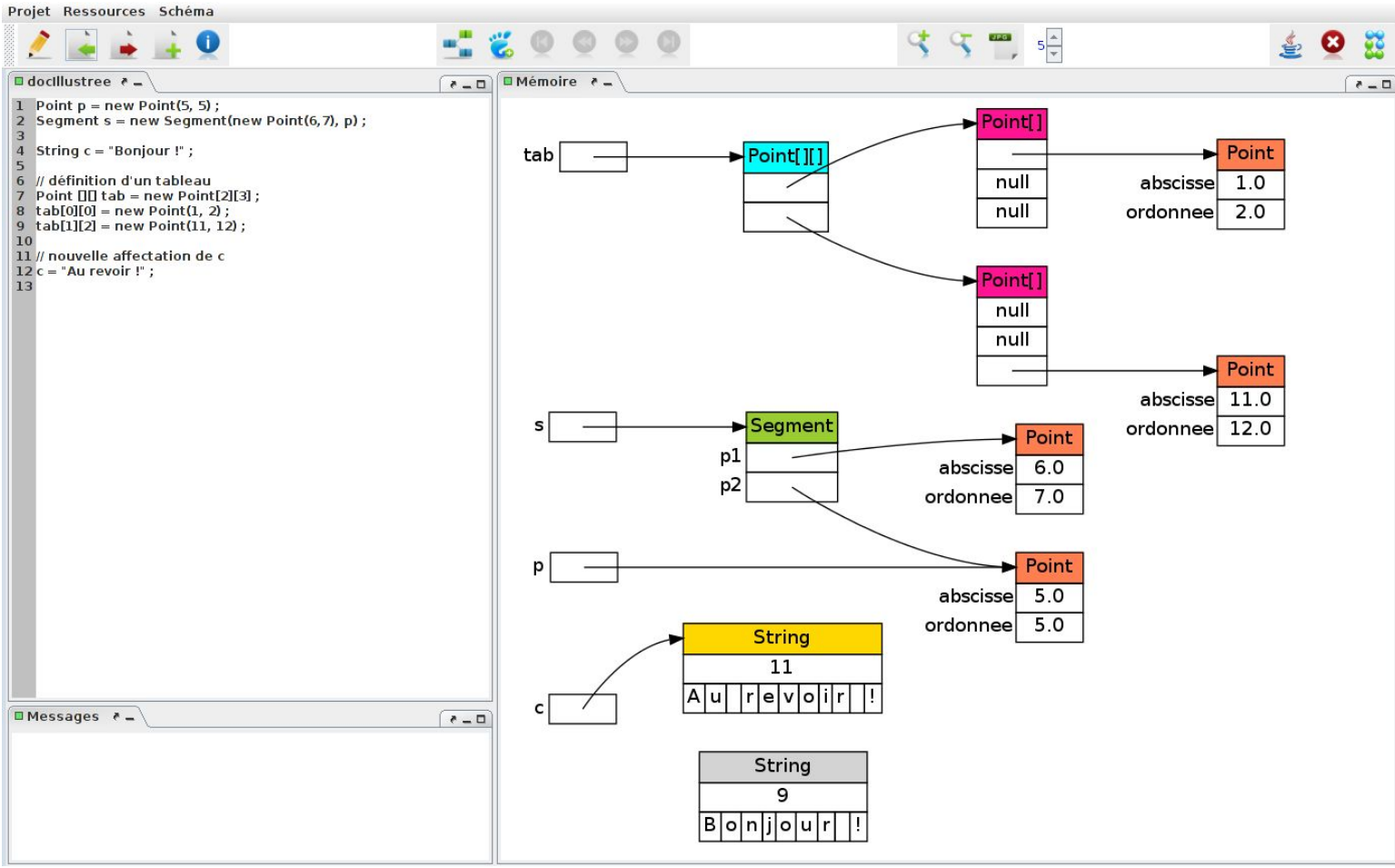
Keywords

Dynamic program visualization, object programming, education, graphic object representation, memory diagram, software

Abstract

artEoz software aims at supporting students in their learning computer programming. **artEoz** original design stems from the authors' long term experience in teaching object oriented programming. It is grounded on offering the students a pedagogical view of the memory state, that is dynamically updated while the user's program runs.

Understanding the programs runtime dynamics requires a mental abstraction of what happens in the memory. A teacher's role is to help the students build this mental representation, which can be used to address any problem. The aim of **artEoz** is to provide the user with a visual representation of object programming paradigms, from variable declarations to function calls. In addition, we made its use easier classical debugger tools. **artEoz** software addresses both beginners and experimented students thanks to its ability to visualize complex data structures.



Contents and practical implementation

The tutorial will introduce the basic usage of **artEoz**: visualize the execution of your program code written in Java or Python. Sequences of exercises will address:

- the basic mechanisms: assignment, instantiation, instantiation per copy, cloning, ...
- more complex paradigms:
  - collections management: arrays, tables, lists, stacks, hash tables, trees, ...
  - memory management: unreferenced objects
  - function calls: parameters, receiver, return value, call stack, recursion, …
  - declaration scopes, nesting scopes, …
  - inheritance, dynamic binding

About 20 sequences of exercises are currently available.They can be customized to fit different students' needs. These sequences were developed, tested and progressively improved during our courses (2nd year undergraduate students in computer science, engineering school, ...) and workshops (secondary school teachers). Some are freely available on **arteoz.loria.fr** website. Alternative / new ideas will be proposed during the workshop based on questions / wishes / goals from participants.

The objectives of this workshop are to show the possibilities of **artEoz** software. In particular, it will emphasize its ease of use to teach beginners students. Also, we will show how to create educational sequences adapted to the learners' profiles and teacher's objectives. **artEoz** can either be used in a classroom or independently for self-learning.

Duration

Between 45 minutes and 2 hours, depending on the application and the participant objectives. Anyone can create their own teaching sequence using **artEoz** educational tool.

Targeted audience

- code programming teachers, who wish to use **artEoz** as an educational tool during their lessons for beginners or for more experienced students;
- and more generally, anyone curious of how this software works.

Resources

Each participant must have a personal laptop computer with administrator rights (**artEoz** install) and internet access.
However, a web version of **artEoz** is currently under active development. **artEoz** will be available for use via an internet browser.

Notes

artEoz software is currently available in two languages: English and French. The website **arteoz.loria.fr** is in French, and partly in English. The English translation will be completed by September 2016.

Biographies

Martine Gautier, assistant professor, Université de Lorraine. Her works are focused on the development of educational tools. **Brigitte Wrobel-Dautcourt**, assistant professor, Université de Lorraine, LORIA (Laboratoire lorrain de recherche en informatique et ses applications). Her teaching in computer science and educational involvement are behind the creation of **artEoz**.