Enabling Educators to Use the Cloud

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Abstract. Cloud computing services are now widely available for the consumer market at relatively low cost for small instances providing services for between 1-100 people. There has been much use of large scale platforms to deliver massively open online courses and learning experiences for students. Unfortunately, these do not always allow individual educators the ability to custom tailor the platforms they use or to have full control over the data that is collected. Here, the design considerations are introduced for Kool (https://github.com/edasi/kool), an open source platform written in Python to allow educators to deploy and configure online learning services. Educator experiences in utilizing the cloud environment provided by the University of Tartu are also documented. Feedback is solicited on the platform and learning prerequisites for its effective use by educators.

1 Introduction

Cloud computing enables efficient teaching through the use of online courses. Software platforms used for massively online courses are also typically used in educational institutions to allow for automated assessment and more efficient delivery of learning materials. Understanding the possible configurations and secure deployment of such educational platforms can restrict the setup of such systems to information technology specialists, depriving educators of some of the options they have control over in the standard classroom.

2 Methodology

At the University of Tartu, many students learn Python as their introductory programming language[L09]. Python is also used in an open online course on introducing programming within Estonia[M17]. It is therefore a good choice for developing an online platform that can be used to introduce cloud computing to a wide audience.

The recently added self service cloud environment to the Estonian scientific computing infrastructure allows educators in Estonia to deploy their own cloud services for teaching[E17]. By providing a simple example Python program for this, it is hoped to stimulate effective and self sufficient use of this cloud infrastructure with a full understanding of the programming aspects. This is done by

keeping the programming aspects to a minimal level so that users are also developers. This should also allow for the development of a self-supporting community that shares best practices.

In producing a minimal but useful example cloud software package, it is expected that educators will want to:

- record enrollment
- record grades
- allow students to see their grades
- quizzes
- redistribute files

The aim is to allow for this functionality in Python. Most of the functionality can be found in the introductory programming course text [G13], and in the software packages School Utils[L13] and Pygrades[Y16]. To enhance upon these and allow for more elaborate data queries, a simple database following the design principles of TinyDB[S17], is used to store student and course data.

Institutions typically use more elaborate frameworks written in web development languages such as PHP and Java, which we expect most educators who are not software developers will be less skilled in[C13,S12]. Time constraints may also prevent the typical educator from acquiring professional web development skills in a variety of programming languages.

3 Summary

A light weight Python library has been created that allows storage of student data and generation of quizzes for use by educators[O17]. The free and open source library, with the addition of a web interface, can be deployed and used by educators in the cloud. Many educational institutions, now offer self-service cloud platforms which allow teachers choice in what educational technology they use and how it is configured. Hence, rather than relying on a single monolithic platform that may not have the functionality they want, educators can create, modify and use simpler software to support their teaching. In addition they can have better control over some of the data generated in the course of their teaching.

4 Further Work

The work is still ongoing. In addition to the current database and quiz system, a simple web based user interface will be demonstrated at the conference. Feedback from conference participants on improvements to the system will be sought and used to improve it. In addition, multilingual support will be added.

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References

[C13] Costello, E.: Opening up to open source: looking at how Moodle was adopted in higher education. Open Learning: The Journal of Open, Distance and e-Learning, 28:3, 187–200 (2013)

[E17] Estonian Scientific Computing Infrastructure: ETAIS Self service portal http://etais.ee/self_service/, (2017)

[G13] Guttag, J.: Introduction to Computation and Programming Using Python. MIT Press, (2013)

[L13] Lawrence, R.: School Utils https://pypi.python.org/pypi/schoolutils (2013)

[L09] Leping, V., Lepp, M., Niitsoo, M., Tõnisson, E., Vene, V., Villems, A.: Python Prevails, In: Proceedings of the International Conference on Computer Systems and Technologies and Workshop for PhD Students in Computing, Article No. 87 (2009)

[M17] Muuli, E., Papli, K., Tõnisson, E., Lepp, M., Palts, T., Suviste, R., Säde, M., Luik, P.: Automatic assessment of programming assignments using image recognition. In: Data Driven Approaches in Digital Education, 153–163 (2017)

[O17] Orenge, A.: Kool. https://github.com/edasi/kool (2017)

[S12] Severance, C.: Sakai: Building an Open Source Community A Retrospective Diary. CreateSpace Independent Publishing Platform (2013)

[S17] Siemens, M.: TinyDB https://github.com/msiemens/tinydb (2017)

[Y16] Yakimenka, Y.: Pygrades https://bitbucket.org/jjauhien/pygrades (2016)