

# Embedding Vendor Certifications in the Cloud Computing Curriculum: Scope, Strategy and Perceptions

Working Group

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## ABSTRACT

A series of previous Working Groups has met at ITiCSE conferences to explore ways of incorporating cloud computing into courses and curricula, including mapping industry job skills to knowledge areas (KAs) and KAs to student learning objectives (LOs). The importance of industry-standard learning content and certification, produced by cloud vendors and others, was apparent throughout this work.

This Working Group will focus on the role of certification within cloud computing curricula, from the viewpoints of a range of stakeholders: students, graduates, institutions, vendors and other certification providers; and employers. Areas for study will include: the scope of available certifications and their mapping to our KAs and LOs; approaches to integrating certification in academic cloud curricula, and challenges involved in doing so; and perceptions of the stakeholders of the role and value of certifications in evidencing employability. The outcome of the work will include a set of recommendations for best practice.

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\*Leader

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## CCS CONCEPTS

• **Applied computing** → **Education**; • **Computer systems organization** → *Cloud computing*;

## KEYWORDS

Cloud computing, education, computer science, curriculum development

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## 1 INTRODUCTION

Cloud computing is a high demand, rapidly evolving job skill need. Employers want assurance that selected candidates for cloud-related job roles have some foundational knowledge and maintain more advanced skills. Therefore, certifications related to cloud technology are an increasing point of discourse in higher education curricula to meet job-skill demands [3]. The integration of industry-standard certifications into IT domain-related curricula in formal education is far from being new [7]. Recent research in curricula-IT domain certification has been on the alignment of learning objectives, job-specific skills, and the ability of employees to remain current with ever evolving technologies [5]. Moreover, the growth

of micro-credentials, offered by a range of parties including technology vendors, frameworks bodies, independent learning platforms and universities themselves, has expanded the options for learners to demonstrate specific knowledge and skills that employers currently want [8].

The implementation of cloud computing certifications in curricula has been difficult or challenging at best. One issue is that the rapid evolution of cloud computing from its early inception has and is changing annually [9, 10]. This has led to a shortage of formal industry standards in comparison to fields such as cybersecurity. There is therefore an associated reliance on public/private providers to define what is required by industry from their viewpoint.

A series of previous Working Groups has focused on aspects of inclusion of cloud computing within curricula, by mapping out a comprehensive set of knowledge areas (KAs) and learning objectives (LOs), developing exemplar syllabi and investigating ways of disseminating and validating the outcomes [1, 2, 4, 6]. It was clear from this work that certifications can be an important driver in the design of courses which aim to provide their graduates with industry-relevant skills. It is timely, therefore, to review the relationship between cloud computing certifications and academic curricula. This Working Group will investigate the perceived value of certification to learners and employers and current and emerging practice in the delivery of certifications in an academic context, and will provide guidance on best practice for academics who are designing cloud computing courses. Our previously proposed KAs and LOs will provide a frame of reference for this.

## 2 WORKING GROUP OBJECTIVES

This Working Group will report on the role that certifications play in the cloud computing curriculum. This research will be framed in terms of the stakeholders and the connections between them: students, graduates, institutions (colleges/universities), vendors (who create certifications and courses related to their own products), other creators of courses and certifications, e.g. micro-credentials (which can include colleges and universities), and employers (which can include vendors). We aim to address the following:

- The scope of currently available certifications, related to our cloud KAs. It is interesting to know to what extent the KAs are covered by current certifications.
- Current approaches to integrating certifications within an academic curriculum. A case study presented in a previous WG report [6] described the integration of certifications within a UK Masters programme and alternative approaches to achieving this, and we aim to expand on that by enumerating approaches that have been successfully adopted in other institutions. We will also explore barriers to adoption, such as criteria that institutions apply for awarding of academic credit and difficulty in assessing equivalence of certifications to credit.
- Perceptions of students. What value do students on academic courses see in certifications, for example in terms of interest and employability, and are they prepared to undertake

extra-curricular activity in order to realise that value. What are the perceptions of graduates now in employment of certifications achieved before graduation and their subsequent career learning path?

- Perceptions of employers. What expectations do employers have of newly graduated candidates for jobs? Are certifications recognised in the selection process and are they subsequently found to be an indicator of job performance, which certifications are most/least valued, what is the relative importance of academic achievement and certification and is the former actually necessary.

Recommendations and guidance for best practice will be presented on the basis of our findings. It is anticipated that recommendations will be presented that will apply to and be of value to all of the stakeholders identified above.

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