Cloud Computing – AoC Position Paper

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Cloud computing and Colleges

'The rise of the cloud is more than just another platform shift that gets geeks excited. It will undoubtedly transform the information technology industry, but it will also profoundly change the way people work and companies operate.'[1]

'As with every other computing trend, the skill lies in harnessing the technology in an appropriate, safe, rational and timely manner, and everyone's journey will necessarily reflect a bespoke mix of factors'.[2]

Introduction

Cloud computing is a means by which an organisation secures access, as and when it is needed, to a shared pool of computing resources. The resources might include networks, servers, storage, applications and services via a cloud computing provider who will manage the resources for the organisation. Large cloud computing providers include Microsoft, Google, IBM, Amazon, RM and others. In the education sector, the Joint Information System Committee (JISC) and the Joint Academic Network (JANET) are increasingly involved in the provision of trusted brokerage services for the provision of cloud services. The use of cloud computing has the potential to reduce the need for complex internal infra-structure and to thus make the management of computing resources more efficient. Moreover, cloud computing is a way of delivering an IT service as a utility so that at any point in time the organisation uses what it needs and pays for it according to usage.

For the purpose of this paper, cloud computing is defined as either:

- Software as a service (SaaS) is the use of software and its associated data when hosted centrally by the cloud computing provider such that the organisation accesses it when and where required. It reduces the need for the purchase of software licences per desktop machine and the need for high levels of processing power at the desktop. Examples include e-mail systems such as Gmail and applications such as Customer Relationship Management Systems (CRM).
- Platform as a Service (PaaS) is the 'rental' of hardware, operating systems, storage and network capacity over the internet. It allows the organisation to rent virtual servers and associated services for running existing applications and developing new ones. It offers significant advantages for development teams. The focus here is often on saving costs in the development of applications by using infrastructure services. A PaaS is a platform for developers to write and maintain their own SaaS. For example, Windows Azure is an open and flexible cloud platform that enables developers to build, deploy and manage applications across a global network of Microsoft-managed data centres. Facebook is a platform where developers can write and maintain their own social applications. The Google App Engine is a cloud computing platform for developing and hosting applications in Google data centres.
- Infrastructure as a service (IaaS) refers to the de facto outsourcing of the IT equipment used to support operations. This includes storage, hardware, servers and network components. The cloud computing provider owns the IT equipment and is responsible for housing, running and maintaining it. Organisations normally pay on a pay per use basis but can opt for an annual fee.

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[1] ('Special Report on Corporate IT', The Economist, 2008).
[2] Fenn, J. & Raskino, M., (Mastering the Hype Cycle: How to choose the right innovation at the right time, Harvard Business Press, 2008, p.7)

The difference between IaaS and PaaS is that in IaaS the user organisation normally retains control over the environment, whilst in PaaS the environment is controlled for the organisation. The line between PaaS and IaaS is becoming more blurred as cloud computing providers introduce tools as part of IaaS that help with deployment.

There are differences in the way cloud computing might be deployed. A 'public cloud' is the model whereby the cloud computing provider makes the IT resources available to the general public over the internet. A 'community cloud' shares infrastructure between several organisations with common interests or technical requirements. A 'private cloud' refers to the infrastructure provided solely for the benefit of a single organisation. A 'hybrid cloud' is, as the name suggests, a mixture of elements of any of the above.

AoC and cloud computing

Cloud computing is progressively being implemented in a wide range of public and private sector organisations. It has many potential advantages in cost and energy savings and it has the potential to enable new ways of working. Colleges are already using cloud computing in a number of ways. The range of new providers of cloud computing and the many different ways in which it might be implemented means that there is a need for Colleges to share practice in the adoption of cloud computing in order to access the best expertise in the field.

The Collaboration and Shared Services Board, established by the Department for Business Innovation and Skills (BIS), allocated £1m for cloud projects from the Shared Services Grant Fund, managed by AoC. The aim of the Board was to progress cloud computing in Colleges through the provision of funding of a range of projects.

Colleges were invited to bid for individual projects by completing an Invitation to Tender (ITT) that had been written by AoC and other partners in the Shared Services project. The ITT allowed Colleges to bid for project funding provided they met the definitions of SaaS or IaaS described above. The ITT were assessed by independent experts, the AoC Innovation Committee and the Shared Services Board before contracts were drawn up for the successful applicants.

A total of 36 bids were selected covering a range of projects involving Colleges and commercial suppliers. The projects are now running and are being managed by the AoC Shared Services project management team. Upon completion, the project reports will be collated to produce reports which will be communicated to the AoC membership.

The potential benefits of cloud computing to Colleges.

Colleges have a history of innovation in the way they support learners and employers. Too often, however, innovation is hampered by the rigidity of existing IT provision. The benefits to be gained from cloud computing depend on the way it is deployed within individual Colleges. Potential benefits include flexibility to engage in new ways of working, improved management of IT capacity to meet fluctuating demand and cost savings in staff, software licensing, infra-structure and energy. Any use of cloud computing therefore has to be considered within the context of the College's overall strategy such that it allows for the flexibility to deliver innovation.

Students and staff, who will be enjoying the benefits of cloud computing in their everyday lives, will expect these benefits to be available in their College. This will include accessing learning applications using mobile technologies at home and in the workplace. While meeting the expectations of staff and students are important factors in of themselves, an

example being allowing College marketing teams to interact with potential students through social media, there are, perhaps, more significant benefits to the use of cloud computing such as allowing for greater access to College resources by those with limited access to on site systems and networks.

Colleges experience fluctuating demands for IT capacity. The factors which affect demand vary at different times of the year, such as enrolment, or by changes to government requirements in data management or teaching and learning and the changes in the commercial contracts managed by Colleges. Cloud computing enables the management of IT capacity according to need. If cloud computing is thought of as a means of providing a service as a utility the issues associated with fluctuating demand might be resolved.

As more IT capacity is required for teaching, learning and administration in Colleges, there will be more demand for server capacity. Whilst many Colleges currently meet changing needs through the virtualisation of servers on its own systems, cloud computing ought to remove the need to purchase additional servers and other capacity to satisfy short-term demands. Cloud computing reduces the need for College based servers, itself a cost saving, and there are significant savings to be made in energy costs associated with the running of on-site infrastructure. The deployment of cloud computing in this area should also be considered with reference to the under-utilisation of server capacity in most Colleges.

Cloud computing, if deployed as part of the College strategic plan, may allow for the efficient use of staff time. The costs and challenges of keeping up-to-date with specialist IT will be transferred to the cloud computing provider. Whilst there will always be a need for specialist IT staff within Colleges, cloud computing should be used to change the nature of the IT management function in Colleges to a more strategic, user focused and less fragmented approach. Routine tasks may be automated, thus freeing up staff to work on creative and innovative solutions to the challenges they confront. Aspects of IT development might remain with Colleges but the use of platform or infrastructure as a service means there will be less need for specialist management of infrastructure.

If the cost savings described above are allied to those associated with savings in software licensing and the management of software upgrades, the adoption of cloud computing should change the nature of spending on IT from capital to revenue expenditure. Moreover, there are real efficiencies to be made from a 'community cloud' approach as Colleges might benefit from shared commitment to establish common requirements such as access, security and legal issues.

Uses of cloud computing by Colleges

SaaS
Many Colleges already make use of cloud computing, in particular in the area of SaaS, with, for example, externally hosted email systems for students and staff or externally hosted CRM systems for Employer Responsive Learning. Colleges that do make use of SaaS are well placed therefore to extend its use in the following areas:

- Applications that have a significant need for web or mobile access, e.g. a Virtual Learning environment such as Moodle or Blackboard
- Software that is used for a short-term need, e.g. collaboration software, such as Huddle, for a specific project
- Software where demand spikes significantly, such as in enrolment
- Applications, such as email newsletter campaign software, where there is significant interaction and external clients

PaaS

College IT support teams, or their IT contractors, might wish to use PaaS to develop applications such as social applications on Facebook or learning applications (Apple iTunes or Google Android) for mobile devices. This approach might be especially useful in any situation where multiple developers will be working on a development project or where other external parties need to interact with the development process. The use of PaaS is also useful for those who have an existing data source, e.g. client information from a CRM tool, and want to create applications which leverage that data.

IaaS

Colleges experienced in the use of cloud computing may wish to use IaaS to address the following issues:

- Where demand is very volatile, e.g. any time there are significant spikes and troughs in terms of demand on the infrastructure
- For situations where the College does not have the capital to invest in hardware
- Where the college is growing rapidly, or merging with another college and scaling hardware would be problematic
- Where there is pressure on the organization to limit capital expenditure and to move to revenue expenditure
- For temporary College business such as pilot activities or short term initiatives

It is acknowledged, however, that there are situations where the use of cloud computing would not be appropriate such as applications where legislation, or other regulation, does not permit data being hosted externally. Whilst there are fears about the security of data held by cloud computing providers the use of appropriate (for the individual College) Service Level Agreements (SLA) with cloud computing providers ought to provide the assurance of levels of security which may exceed existing on-site management of computing resources.

The adoption of cloud computing by Colleges is not simply a matter of solving technical problems as a purely technical approach will not deliver in respect of the College's future strategic needs. Other factors to consider are:

- The requirements of the College's strategic and operational plans and how cloud computing might best support delivery
- The cultural and change management issues which feature in the successful implementation of cloud computing and what this means for staff, students and other stakeholders
- SLA with a largely new set of cloud computing providers who are at an early stage in their relationship with Colleges. Colleges need to avoid becoming unwittingly locked into agreements with cloud computing providers that might prevent the delivery of future requirements; Financial constraints
- The level of student and staff expectations

In deploying cloud computing, it is clear that Colleges may require impartial and consistent support and this is one reason why AoC has been so closely involved with the Shared Services Board project.

A further means of support for Colleges lies with JISC and JANET, both of which have many years of experience of supporting IT in further and higher education, e.g. JANET provides the main external network infrastructure for this community. BIS are continuing to support JISC/Janet and are currently in the process of securing Cabinet Office approval for the next network upgrade, Janet6, and it has been recognised by Government that Janet offers

assured procurement and cost benefit. In 2011, JISC embarked on a £12m, HEFCE funded pilot for cloud computing project for universities. The bulk of this funding is being applied to infrastructure and JISC will be brokering cloud computing services to further and higher education. It is hoped that JISC and Janet will be able to facilitate efficient procurement for individual Colleges and universities and for the education sector as a whole. Advice on how best to deploy cloud computing will be available through JISC Advance, JISC Infonet, JISC Legal, and the Regional Support Councils (RSC) JISC are providing advice to the further and higher education sectors. The more structured, and formally constituted, involvement of AoC with the governance of JISC will help to ensure that the specific requirements of Colleges are integrated into the JISC strategy for the innovative use of technology.

Conclusion

This paper has sought to clarify the definition of cloud computing as it has been used by AoC in the context of the Shared Services Board project. In suggesting the possible uses, and benefits, of deploying cloud computing, the paper is advocating a considered and incremental adoption of the various cloud services available. The intention of the paper is not to recommend any particular cloud computing provider, service or application and it is not advocating the dismantling of College IT departments. It is suggested, however, that the move towards cloud computing is inevitable for a series of technical and financial reasons. The paper has described the benefits that cloud computing might bring Colleges, but has been careful to recognise the series of factors which determine its successful adoption and the support Colleges will require to realise those benefits.

AoC, working with BIS, JISC and other partners has helped to disburse funding for cloud computing projects, and will continue to offer support in their implementation, but it is argued here that Colleges should drive the development and implementation of cloud computing such that it meets the College's objectives and achieve the requisite gains for staff and students.