

Robust delivery of eAssessment

Bill Warburton

Nick Williams

Graham Robinson

iSolutions, University of Southampton

Abstract

Some of the most significant obstacles to the uptake of eAssessment for summative and credit-bearing applications are threats to the integrity of invigilated examination related to a lack of robustness in procedures and computer systems. Many of these risks, once known, can be effectively mitigated. This paper describes how the University of Southampton adopted simple but effective measures that address intrinsic weaknesses in workstation provision. Findings include: enhanced levels of user confidence, more robust delivery of exams and decreased volumes of support calls. Suggestions are offered as to how other institutions could benefit from a similar approach.

Introduction

It is well known that threats to the integrity of invigilated examination, such as a lack of robustness in procedures and computer systems, represent significant obstacles to the uptake of eAssessment for summative and credit-bearing applications (e.g. Warburton, 2009). Many of these risks can be effectively mitigated by putting in place simple but effective measures that address intrinsic weaknesses in workstation provision.

Some universities are able to accommodate computer-based examinations in dedicated workstation areas and there are significant advantages in so doing (Dermo, 2008; Moge, 2010). However, many institutions are obliged to conduct examinations in existing public workstation areas, which can often suffer from a number of practical drawbacks (see table 1 below).

Table 1. Features and consequences of using public workstation rooms for CAA

Feature	Consequence
Often physically small (< 40 seats)	Costly to manage and invigilate
Publicly accessible	Difficult to maintain acceptable quality standards
Broad software portfolio	Start-up delays and difficult to fault-find

Mitigation of risks associated with using public workstation rooms

The risks associated with using public workstation rooms for CAA are well understood, but in common with many other universities, Southampton's public workstation provision 'grew like Topsy' over a period of more than 30 years. It evolved from one or two small rooms with minicomputer and mainframe terminals in the late 1970s to more than 30 rooms of varying sizes in 2011.

Small rooms

It is costly to manage and invigilate CAA exams in small rooms because at least one invigilator is needed for each room, but the only real alternative seems to be for the University to find significant capital funds for the redevelopment of the common learning spaces.

Many undergraduate cohorts at Southampton are large: for example in some First Year modules the Faculty of Health Sciences has to test up to 500 people at once and it is quite possible that this requirement may grow in the future. Conducting exams in a number of small rooms also represents a threat to the integrity of the exam due to the associated problem of having to administer them in multiple sittings.

The great majority of our rooms are physically small – most are 40 seats or fewer - and none were purpose-built. Due to the University's desire to make efficient use of available space, they are densely populated with the result that students sit close to each other, typically with a gap of 0.4m or less between them, which works out at rather less than the 1.4m spacing recommended in BS 23988:2007. There is a considerable risk of adjacent students being able to see each other's' answers on screen. We investigated polarized screen filters as a way of reducing viewing angles, but commercially available filters turned out to be both costly and difficult to manage physically.

Another commonly advocated mitigation for close spacing is to require exam questions to be selected randomly from item banks (Sclater, 2004) but, quite aside from concerns about the time and effort needed to maintain large item banks; this is often impractical due to concerns about equivalence of difficulty/discrimination in banked items for summative use. We therefore require all exams to have randomized order of both item appearance and item responses, and verbally warn students about potentially serious consequences if they are suspected of being in breach of academic integrity rules, and this appears to work well.

Public access

There are a number of obvious drawbacks related to workstation rooms that are publicly accessible being used for CAA exams, but most of them can be summarised as a difficulty in maintaining acceptable quality standards. There is often little supervision of public workstation rooms leading, for example, to the risk of equipment being found unexpectedly unplugged or damaged during the start of an exam – even when diligent and consistent efforts are made by support staff to check the integrity of workstation equipment beforehand.

This problem of finding public workstations unfit for purpose at inopportune times has recently led us to seek ways of making remote and proactive checks on workstation functionality. The following screenshots illustrate one of our 'works in progress' which provides a list of every public workstation that can be found on the University network. It allows support staff to check for missing computers at a glance, and to audit very quickly and simply any target machine (Figures 1 to 4, below).

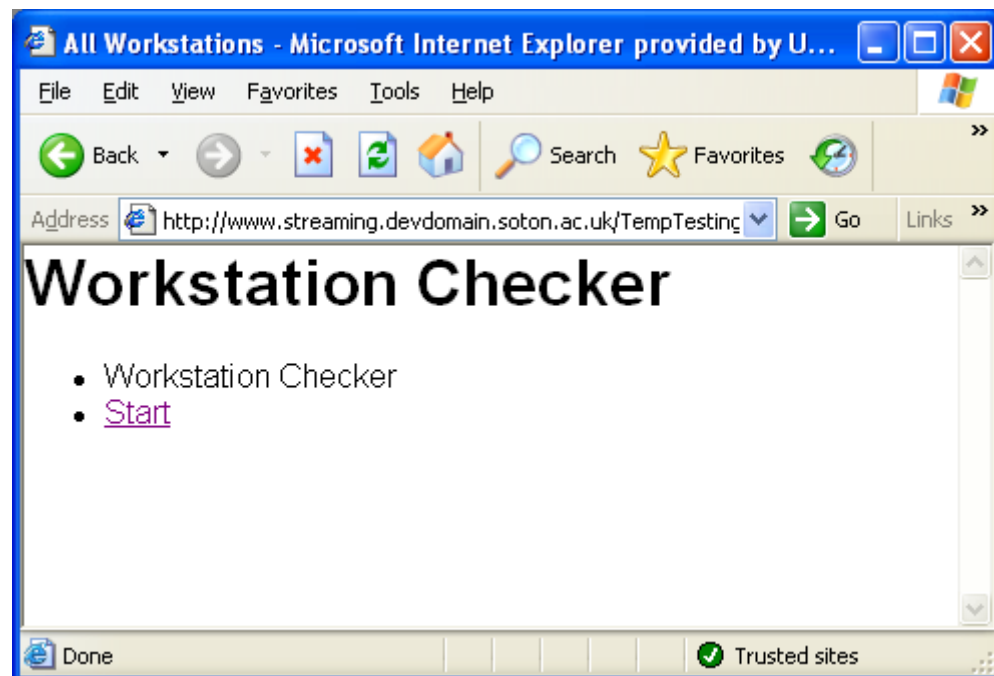


Figure 1 - Proactive Workstation Checker

Once started, the Workstation Checker lists all available public workstations categorized by building and room number (figure 2, below).

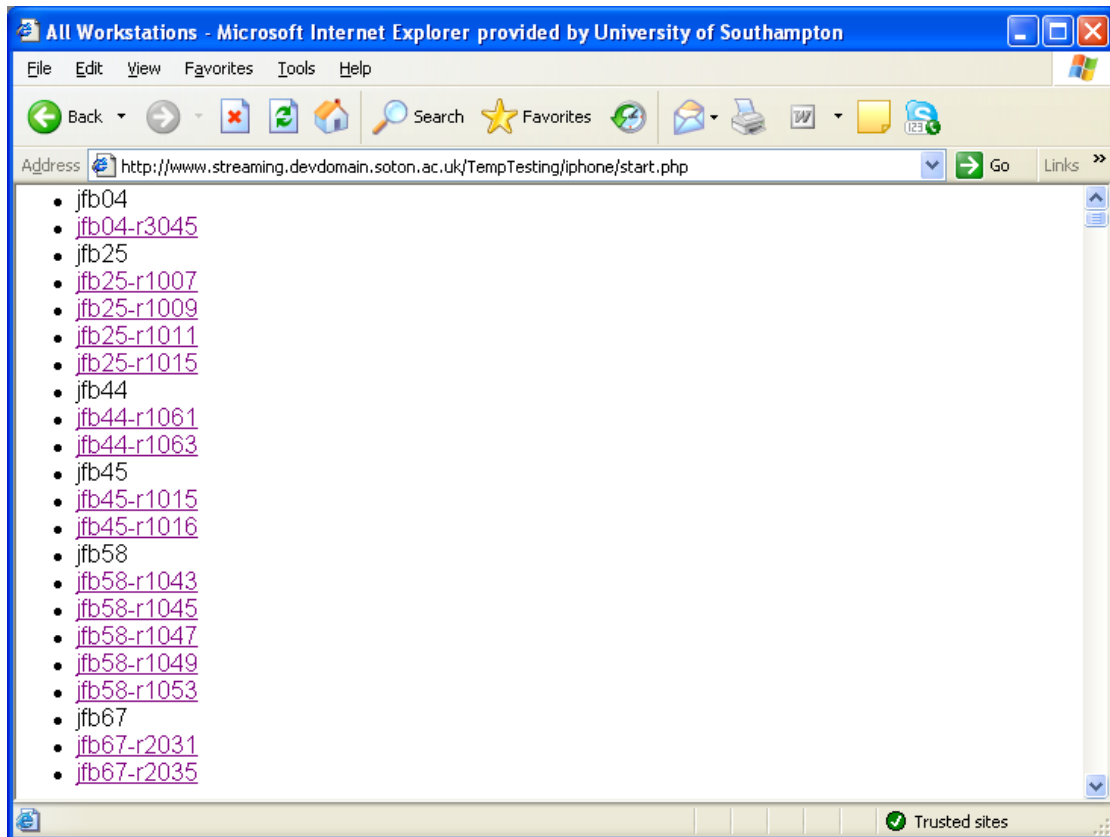


Figure 2 - Workstation Checker's list of Public Workstation Rooms

We select Building 25, Room 1007 (jfb25-r1007) for a list of workstations (figure 3):

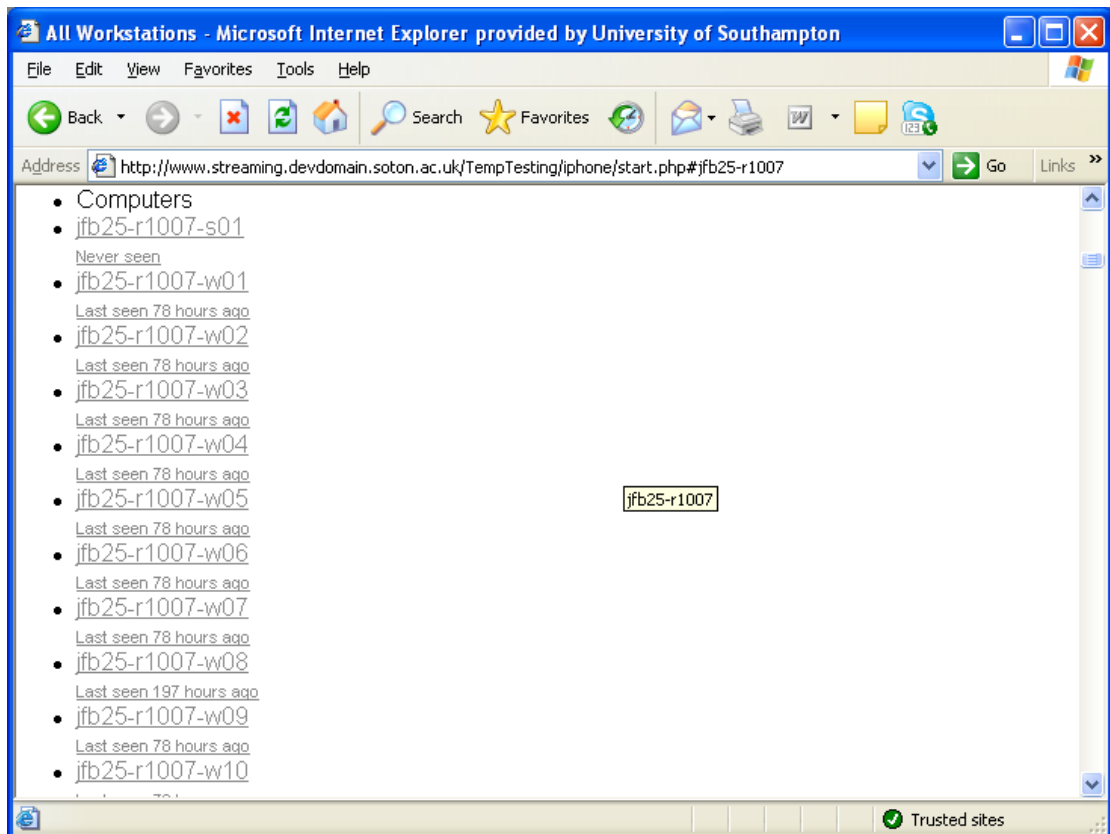


Figure 3 - Workstation Checker's list of working computers

Selecting workstation 1 within that room ([jfb25-r1007-w01](#)) yields the following Details screen. This shows at a glance if any items (keyboard/mouse/display) have been unplugged (figure 4 below) and when it was last used, and by whom:

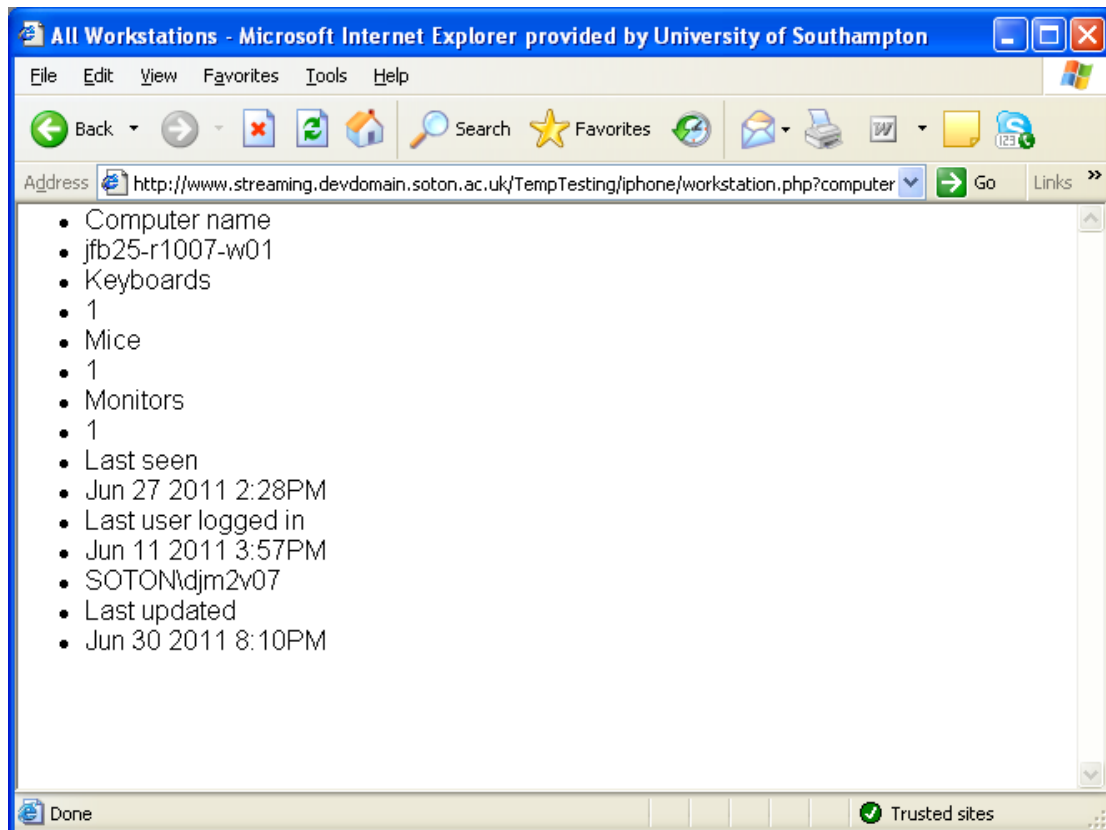


Figure 4 - Workstation Checker's Details screen

Software loads

The University manages a broad software portfolio comprising many hundreds of software applications, a high proportion of which may be installed on some public workstations that are be pressed into service for CAA exams. This inevitably causes start-up delays whilst the software is loaded, but more seriously, it can result in runtime issues that are unexpected and difficult to resolve.

Therefore we have also been looking for ways in which the software integrity of public workstations can be quickly and simply verified shortly before exams begin. A 'traffic light' metaphor was adopted as an appropriate and familiar expression of confidence in a workstation: the self-test program begins with an amber background to indicate an untested state – it may be OK, it might not – with unambiguous red (fault, do not use) and green (OK, go ahead) outcomes depending on whether all resources required by an exam are found to be present and correct (figures 5 to 7 below). The test takes a fraction of a second and can be invoked by exam candidates, invigilators or support staff.

The first step is for the test to be started (figure 5 below):



Figure 5 - PC Self-Test Utility

Once invoked, the checker looks through a pre-determined list of resources required by the exam. Some of these sub-tests are generic (can it 'see' the network? Is a printer configured?) - others are specific to particular CAA exams (figure 6 below).

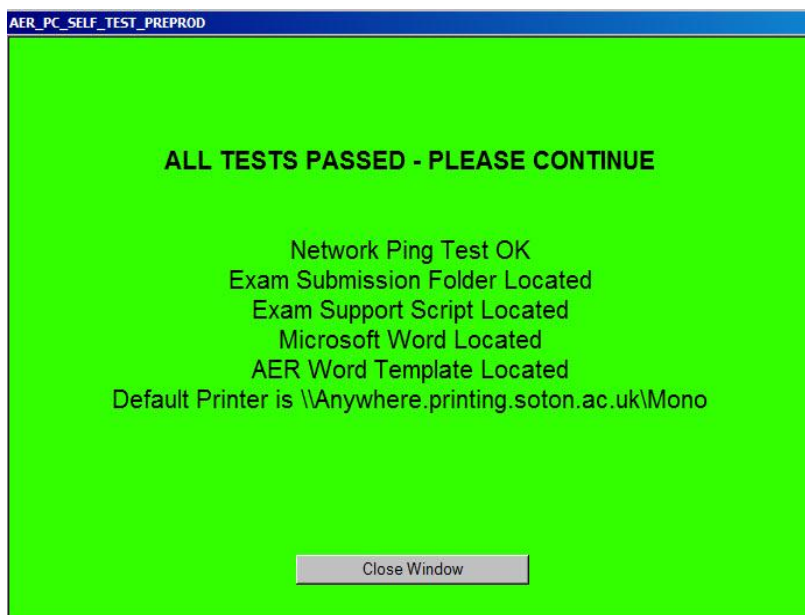


Figure 6 - Self-test passes

When the Self-test check program passes, the person that invoked the test can proceed to the exam itself by closing the green status window.

However, it is a different matter if a required resource cannot be located and the program throws an error message which can only be cleared by support staff who know its password (figure 7 below):

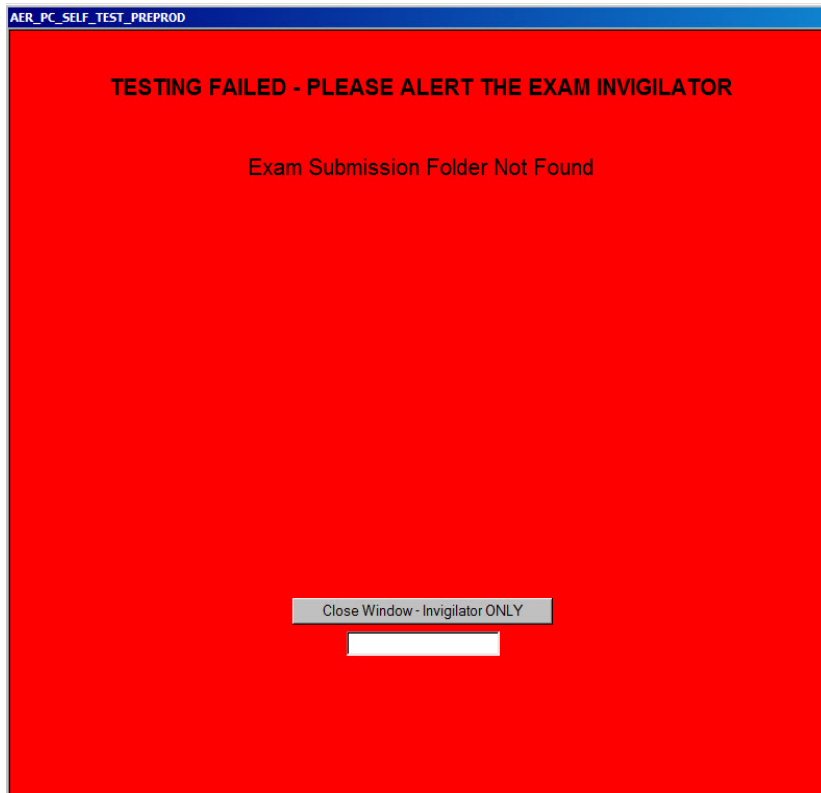


Figure 7 - Workstation fails Self-test

This failure window prevents the workstation from being used at all, other than to allow support staff to login and conduct fault-finding work. Consequently, students are largely protected from losing work due to using a workstation that doesn't work properly, academics are insulated from the stress and anguish of a high-profile CAA failure and support staff are freed to concentrate on real emergencies rather than being bogged down with preventable routine problems.

References

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