Delivering online exams consistently

In the context of the recent glitch in the CAT, the writer describes how online exams can be administered without a hitch.

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I have headed a team that has delivered over a million computer-based exams in India over the past few years. Through this experience, we have learnt a few things about delivering online exams which I describe below.

Online exams are a great example of technology and trained people coming together to deliver a great experience to candidates. And these exams are as much about trained people as they are about technology.

The technology for a computer-based exam consists of an examination software application installed on a server. The examination software platform has back-office and front-office modules. The back-office modules manage hall tickets/attendance sheet creation, question paper generation/distribution and report publishing — processes where there is no face-to-face interaction contact with the candidate. The front-office modules manage processes where there is face-to-face interaction with the candidate.

BACK-OFFICE MODULES

The back-office modules of the examination software application reside in a single location and are run off a few servers in a highly-controlled environment. A small number of people manage the back-office and it is easy to ensure complete compliance with processes. Ensuring that the back-office technology is up and running, switching to failovers in case of a problem and ensuring that data on the back-office modules is secure is simple. But the front-office modules of the application present an array of challenges owing to the fact that they have to run on thousands of PCs across hundreds of exam centres. The front-office technology consists of checking-in candidates and presenting examinations to candidates.

Checking-in candidates in an examination happening at a 100 exam centres across the country would mean each check-in desk would be required to check-in about 50 candidates (assuming 5,000 candidates are taking an exam at one time.). And all 5,000 candidates have to be checked-in in an hour (since candidates would report an hour before the exam). This is similar to checking-in passengers at an airport across a 100 check-in desks. The difference is that every passenger's biometric and photograph has to be recorded at check-in desks spread across different exam centres.

The challenges in doing this is that check-in desks have to be fast since examinations at different centres cannot start at different times and all check-in desks have to complete checking-in all the candidates in time.

Owing to this, the check-in technology has to work fast — quickly capture a candidate's

Students wait outside a centre administering the CAT 2009 for admission to the premier business schools in the country. — K.Murali Kumar

biometric and photo, check details and admit the candidate. In addition, the check-in technology has to have a built-in database, OS and hardware redundancy which means the technology has to be deployed on two different servers and the check-in data on the server has to be automatically copied to the other server. In case one server fails, the back-up server is used to do the check-in.

PRESENTING EXAMS

Presenting examinations to candidates is the most important part of an examination. This is where the rubber hits the road. As a first step, the user interface design needs to be discussed, debated, tried out, modified, tried out again and then finalised. Every little thing on the computer screen matters. It has to be debated whether a button should be named "End Test" or "Quit"; whether the "End Test" button should come up only when the candidate is on the last question; whether navigation buttons that allow the candidate to move to any question should be on the left hand side or at the bottom of the screen; the font size of the questions that come up; the area where images are shown; will candidates require to horizontally scroll; or will they have to vertically scroll. The next step is to put the user interface on a Web site and have candidates try it out and provide feedback. The feedback needs to be incorporated into the final release. The idea is to give every candidate an opportunity to try out the user interface several times before the actual exam. This is the only way "fairness" can be achieved. The third step is ensure that the exam presentation technology has extraordinary "exam resume" capabilities. This would mean that the technology should allow resuming the exam from any point. And the technology has to be stress-tested for several power cuts in a short time span (a situation unique to India); pulling out a network cable; a keyboard not responding; the OS hanging; and so on.

The exam presentation technology has to assume that exams will be interrupted. It has to be able to restart where it left off, no matter what. And it has to restart with no disadvantage to the candidate. In India, computer labs in colleges and other locations are not set up as "best-in-class" infrastructure because it does not make commercial sense to the institutions. Also, to expect that 5,000 computers will work correctly at a given point in time is inherently poor planning. So, it is imperative that the exam presentation technology instead is "best-in-class" so that it runs on virtually any quality of infrastructure.

While technology is crucial, the quality, training and response of the people who meet and administer the exam is what finally matters. This would mean the people who are deployed to do the exam are trained to ensure processes are completed efficiently. Also they should be trained to ensure any disruption is handled effectively with minimum disturbance to the candidate.

Thus training should cover various scenarios — when a check-in desk goes down or a biometric device stops working or the computer the student is working on hangs up..

Finally, an examination project is only as good as the project management that goes into planning the exam. The project management has to look into all aspects of the exam — communication with students; helpdesk; applications; schedule; question papers; exam delivery; etc. Like all good projects, there should be identified risks and known and planned mitigation steps.

The planning should take into account a range of uncertainties — proctors reaching exam centres late, flights getting delayed/cancelled, trains reaching late, power outages, and the like. Perhaps the most crucial thing is to ensure that the project management team is experienced in managing a computer exam in the country.

Delivering computer-based exams brings together people, processes, infrastructure and technology. With a rigorous project management approach, it is possible to deliver online examinations successfully.

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