Control of Computer Based Assessments

The Client

OCR (Oxford Cambridge & RSA Examinations) provides general and vocational qualifications to schools, colleges, employers, and training providers in the UK. OCR is one of three business units which make up UCLES (the University of Cambridge Local Examinations Syndicate), itself part of the University of Cambridge. As well as providing assessment services, UCLES and OCR are committed to the use of new technology to drive forward innovation in assessment, assessment delivery and learning.

In line with this drive for innovation, OCR sponsored the University of East Anglia to develop computer based assessment engines. Initially targeted at word processing, the project has been extended to cover a range of desktop computing skills. Today, assessment engines are available for all the mainstream units within New Computer Literacy And Information Technology (New CLAIT) qualifications.

Initial Objective

Candidates sit CLAIT examinations at over 2000 centres across the UK. The business requirement is for centres to submit batches of entries for assessment by OCR and to receive back a collated results file electronically. At least 90% of the workload should be processed automatically. Where batches or entries raise exceptions these need to be returned to the centre, or directed for investigation at OCR, they should not impede the progress of other submissions.

In performance terms OCR want to provide a 24 hour service level to examination centres for 99% of submissions. The solution offered needs to be scalable to allow for a growth of between 700% and 2000% in the volume of entries over the next 5 years.

The Project

From an initial list of 27 products categorised as either workflow or business process management OCR evaluated 8. The decision to use Stateframe ™ was based on:

- its ability to manage tasks within a hierarchy of cases, a batch is broken down into entries and each entry is managed individually by Stateframe
- it's handling of problems with the data submitted, issues are directed to users for manual investigation and other work is not affected
- it's scalable architecture, this allows variations in workloads to be managed effectively.

According to Ian Smith, the Project Manager, the scalability of the architecture was particularly important because:

> "As well as enabling us to manage our long term growth via incremental changes to the hardware platform, the Stateframe solution allows us to manage peaks and troughs in the workload during the academic year. Stateframe and Alia Systems have delivered a system whose performance is impressive; a single agent allows us to process 6 or 7 times faster than our previous system and our experience is that this is pretty linear."

OCR's reasons for selection are founded in Stateframe's unique State model. The model is simple to understand, yet extremely powerful. It is the strength of this model which enables Stateframe to:

- communicate between cases and sub-cases and across siblings, entries are managed individually by Stateframe, when all entry processing is complete results are collated at batch level
- route exceptions for manual attention. Stateframe is designed for non-linear processing. A user-friendly view shows the progress of each entry in the context of both the batch and the other entries in the batch
- queue work for automatic processing by robot users (agents) and monitor the workload. This, in turn, provides the required scalability, as volumes change agents can be added or subtracted.

The main elements of the project are:

- entries are batched into a ZIP file at the centres and transmitted via OCR's secure site
- on arrival Stateframe takes control, the batch becomes a Stateframe case
- the integrity of the batch is validated and sub-cases are created for each entry
- entries are managed independently through several steps, relevant to the examination taken, each step can complete the sub-case
- once all the entries in a batch have completed the results are collated and emailed to the centres
- data problems may cause a batch or entry to fail, this will divert the case for manual follow up either at OCR or optionally back to the centre
- batches or entries directed for manual investigation can be re-started or re-submitted, and candidates can re-take examinations they have failed.

The Technology

The system operates in a Microsoft and web environment using SQL server

- processes are designed using the Stateframe Mapping Tool (a Microsoft Visio plug-in)
- Stateframe is designed from the API outwards, a bespoke agent (run as an NT service) has been written for this project but manual follow-up is via the Web client supplied as sample code (a sample Windows client is also supplied)
- Any number of agents can process a common intray
- Stateframe Security controls what each agent and user is allowed to do
- the Overdue Scan (also run as an NT service) monitors service levels, raising actions as required
- emails are sent via SMTP, using the Microsoft CDONTS library.

The Results

After 8 months in operation an internal review was carried out in September 2004. According to Peter West the Professional Officer for the CLAIT qualification:

> "Throughput is already more than 150% of previous capacity and we are achieving 97% automatic responses compared with a target of 90%. There have been savings of two full time people, equivalent to over 90% of the original staffing levels.
>
> In summary, we are delighted, the system has exceeded expectations. We can now market CBA CLAIT knowing we have a system that will deliver."

Further Information

For further information about Stateframe, and other case studies, please visit our website www.alia.co.uk
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