Guru Secure Exam Paper Management and Validation

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1. SUMMARY

Guru Exam was developed at Dublin City University (DCU) as a SaaS solution to secure the exam paper creation process and facilitate exam paper validation through the 'External Examiner' system used in Ireland, the UK and some other countries. It increases quality by better engaging External Examiners, provides evidence-based statutory reporting, exam paper publishing and other requirements. The system is in use for all exams at DCU and at other institutions.

2. SECURE EXAM PAPER AND VALIDATION SYSTEM

Higher Education institutions run thousands of examinations annually. Each exam needs a unique exam paper that has gone through detailed quality checks. These checks can be difficult for institutions: how do they ensure that papers are of high quality, how do they share documents securely and how do they validate that institutional processes have been followed.

Some third-level systems have standard quality processes involving peer review of exam papers through the use of 'External Examiners', who review exam papers and solutions prior to exams and provide feedback. Both internal document production and external quality processes have security implications. Many institutions have suffered exam papers leaks, lost USB memory sticks or physical papers/solutions have been left in photocopiers.

The author is an academic and software developer at Dublin City University in Ireland and began looking at these issues in 2014. At that time, exam papers in DCU were largely managed manually. Academics printed their documents and handed them to administrators. For external review, administrators sent documents by courier to external examiners. This was labour intensive, caused security issues and missed deadlines, did not support audit oversight and led to poor engagement.

While the original DCU approach appeared outdated, discussion with other institutions showed similar approaches and issues. Some had attempted digitalisation of aspects of the process, but these typically were not end-to-end, had unwieldly security protocols and encountered the same problems as the paper-based model. Some had attempted to use third-party systems (e.g. SharePoint, DropBox, Moodle or content management systems), but these were poorly received in institutions. DCU had previously attempted a Moodle-based pilot in 2013/2014, which was cancelled following negative feedback from academics.

The author began the process of gathering requirements from stakeholders at DCU and started development of a prototype 'Guru Examination and Review System'. Figure 1 shows the initial concept diagram for the primary functionality. The system would be a Cloud-based (AWS), SaaS application with logins for all stakeholders. It would directly interact with the Student Information System for programme structure and module ownership information. Internal logins would be managed through University single-sign-on and external logins would be managed through two-factor authentication.

The system supplies client-side encryption (e.g. encryption of documents on academics' personal devices). Word templates automatically complete front-cover information, saving time for academics and ensuring consistency, while simultaneously ensuring that documents are encrypted at all times, including before they are uploaded to the system.

After one year of development, a four-school pilot was performed. The exam session progressed without issue, introduced a range of improvements and 100% of 62 survey respondents indicated their desire to immediately move to this new model. In the following academic year, all examination papers across four campuses were managed through Guru. With additional investment, a team of developers was put in place to accelerate development.
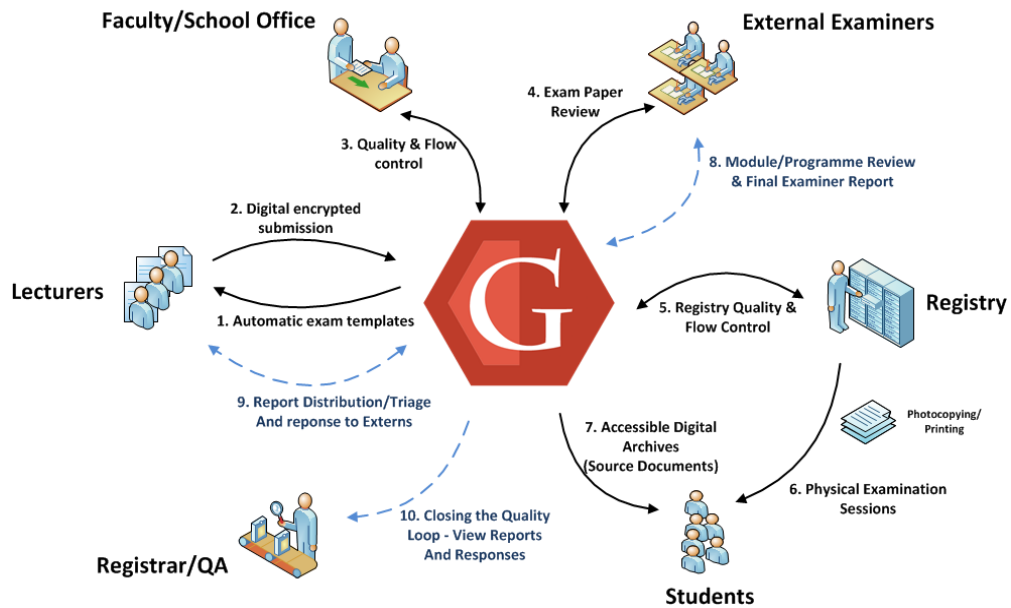
Figure 1 – Stakeholder Interactions around Examinations and Review

Adoption of the Guru system has seen a wide range of improvements for both DCU and subsequent adopting institutions, including:

- Improved quality and consistency of examination papers and continuous assessment material
- Securing of thousands of security vulnerability points for the University
- Complete process oversight, audit trails and document tracing across all engagements
- Considerable reduction in workload for academics, external examiners and administrators
- Advanced document archival and accessibility functionality for students
- Streamlined processes resulting in fewer issues, faster turnaround and improved deadlines
- New functionality for accreditation, such as automated sharing of documentation with statutory oversight agencies
- Reduced environmental footprint & lower printing/courier costs
- GDPR compliance

Figure 2 – Sample Screenshot from Guru Examination System (Academic View)