APACHE CAYENNE PRODUCT AS A TECHNICAL TOOL IN ORGANIZING THE EDUCATION PROCESS

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Abstract. The approaches and technologies that affect the effectiveness of the learning process in the organization of the distance learning process are considered.

Ish hires ObjectStyle to modernise its student management platform, grows business by 300% in the course of 5 years. Ish is the company behind onCourse™, a widely-used software platform that allows colleges and short course providers to manage enrolments, curricula, student grades, and other aspects of the learning/teaching process. The platform serves dozens of educational entities in Australia including such heavyweights as The University of Sydney, Sydney Community College, NIDA, Power Training Services WA, and is one of the most popular solutions in the market.

Challenge: Ish wanted to revamp the content management system and the student/tutor portal components as well as make it easy to add new features. Ish had originally chosen WebObjects as a web platform and that tool had been largely abandoned, so a change of technology was needed. Ish was also picking up big new customers, including universities, that required the production servers to be able to scale with increased volume [1].

Rich and scalable technology solutions allow to quickly deploy custom websites with real time online enrolment and applications, AVETMISS & USI compliant student and staff portals, and a CRM sales, marketing and data reporting tool with a multi user cloud or locally hosted backend driving the entire integrated stack.

Making useful systems requires creativity and a wide variety of skills; software development and technical analysis combined with a deep understanding of the realities of the training industry and compliance requirements are all essential. These are fundamental to producing a system that works in the real world. Programming itself is often the easiest part of the development process; creating an interface that is intuitive and a system that models the actual business needs are real challenges [2].

Apache Cayenne is an open-source ORM (object relational mapping) solution that has unique features that are not found in Hibernate/JPA. It addresses a large number of persistence needs. Started by ObjectStyle's founder Andrus Adamchik, Cayenne joined the Apache Software Foundation in 2006. One of Cayenne's first adopters was the National Hockey League. The Cayenne framework still underpins much of the league's software.

Solution: Colleges received an improved, more feature-rich and flexible content management system (CMS) which they could use for publIshing catalogues, individual courses, promotions, and other CMS elements. The revamped CMS provided additional space for customizing the look-and-feel as well as the layout of the materials that colleges put up on their websites.

An essential part of the upgrade was the introduction of a new online portal for students and tutors. Upon logging into the portal, teachers could mark student-attendance and give grades to students, while pupils could see their courses, time-tables, grades, and other information. Another important addition was a new billing system which Ish managers could use to keep track of and bill colleges that incorporate the onCourse system into their websites, and other properties [1].

Your student portal is a tool to provide additional information to your students post enrolment. When a student enrols for the first time, they are sent a special link to complete additional AVETMISS data questions, and supply and validate their USI in the portal. A once off subscription to their class timetable via RSS feed means your students will have no excuse for forgetting when or where their class is held. If you make changes to their timetables, their calendar will update in real time. Student course notes and assessment resources can be uploaded to the portal, along with certificates on the successful completion of their course. For students on payment plans, they can access copies of their invoices and payment schedule, and make additional payments as needed if they happen to fall behind.

Tutor Portal: Tutors can see in advance every class that was scheduled them for into the future. Once classes are open for enrolments, tutors can check their portal at any time for the current enrolment numbers vs class minimums, reducing calls to your office to see if classes are likely to run as advertised. When the training commences, tutors can mark their class rolls electronically, on their mobile phones as students walk into the room, identifying the students via their profile picture. As assessments are completed, tutors can update the student training outcomes, triggering automatic certification to be issued.

Where CRICOS Agents are engaged as enrolment brokers, and need visibility of student attendance and payment schedules, the Agent portal will allow them to see everything they need to know about their student progression. With commission payments calculated on payments made directly to you from the student, or collected via re-reimbursement of payments made to the Agent through the portal, you and your Agents will have piece of mind knowing that everything is monitored and visible across the board.

To effectively manage your training programs, you need an understanding of your resource allocation and their associated business expenses. Room and tutor allocations are checked for collision on allocation, and expenses for your resources populate into the class

budget, to keep you informed at all times of your running costs, sunk costs, and necessary enrolments for both break even and profit. Detailed timetabled views for tutors and rooms, plus unavailability management when external events take your resources out of the picture, allow for effective reporting and resource allocation management across your campuses.

Amazon cloud hosted version and access controlled document management is included as standard with all managed solutions. Need to upload a resource to all classes from a course? Simple. With a rich tagging and document allocation engine managing your training and assessment content in the heart of your student management system, putting your fingers on evidence for audit compliance becomes a breeze. Automatic uploads to the document management system of records like student certifications issued also provide your students with the ability to log in, download and print resources and certificates they've misplaced without having to contact your office staff. With a public API print report and export reports available to adapt to your needs, your reporting options are only limited by your imagination. Each printed report can be set up with a custom PDF background, so without getting your hands dirty in a report editing engine, you can add your business letterhead and certificate background to any of the standard print reports you want to customise. If you're keen to adjust report content or layout, open source editing tools let you reconfigure print reports to your heart's content [2].

Ish wanted to improve the search functionality of the onCourse platform. ObjectStyle built a new Solr-based search engine, which was easy to scale and very flexible to cope with new requirements. The Objectstyle team added location based distance searching, faceted search, and complex search combinations to support a wide variety of customer needs. At all times, search responses were kept under 100ms [2].

Technology stack: Java: Apache Cayenne, Apache Tapestry, Apache CXF, Google Guice, ActiveMQ, EhCache; JavaScript: JQuery, Google API, Backbone, Bootstrap [1].

Cayenne is a Java object relational mapping (ORM) framework. In other words, it is a tool for Java developers who need to talk to a database (or many databases). Rather than hardcoding SQL statements through Java code, Cayenne allows a programmer to work only with Java objects abstracted from the database. Here are just a few benefits of the Cayenne approach to persistence: portability between almost any database that has a JDBC driver without changing a single line of code in your application; no knowledge of SQL is required (while it still can be helpful); code which validates any data committed to the database is easy to write and foolproof in operation. This might be as simple as ensuring passwords have enough characters, or a complex check on the validity of a set of accounting operations in a general ledger transaction. This allows you to move common error checking code out of the GUI layer and provides valuable protection against programming mistakes; caching in order to make your application faster and avoid repeated hits on the database for the same data;

automatic faulting (lazy loading) of relationships, but easily supports prefetching of related data for improved performance when needed; pagination which reduces bandwidth and query times by only loading the contents of objects when they are actually needed. The classic example of paging, which differs from faulting, is when a query returns 97 records, and you want to display 10 at-a-time to the user. With paging, only the first 10 records are fully loaded. Cayenne will automatically load only the page of records as they are requested; configurable optimistic locking to ensure data integrity and prevent unexpected data issues when another tool has changed the database behind the scenes (such as a maintainer updating a record in the database while a Cayenne-based application had the same record loaded to make changes); a GUI-based database/schema modeler to simplify learning Cayenne. The modeler saves to XML-based files, which can be hand-edited if needed.

Also here are a few things that set Cayenne apart from other ORM products: cayenne can also work in three tier (ROP) mode where multiple clients connect to the data source not via JDBC but through a remote Cayenne controlled service. This gives much greater control over centralized validation, caching and a seamless persistence of objects from the server through to the clients. The clients might themselves be web servers delivering a distributed load balancing web farm or a rich GUI client such as a desktop Swing/SWT application; a persistent object doesn't have to be of a class known at compile time. Instead Cayenne can use a generic class with mapping defined dynamically in runtime (all without any bytecode manipulation); cayenne supports "nested contexts" allowing an arbitrary number of nesting levels for commit/rollback operations. This way a user can create "scratch contexts" for working with objects, with the ability to discard (or save) those changes without affecting an overall larger set of uncommitted changes [3].

Cayenne is distributed with CayenneModeler - a complete GUI mapping tool that supports reverse-engineering of RDBMS schemas, editing object-relational mapping projects, generation of Java source code for the persistent objects and other functions.

Results: With the newly rebuilt platform at hand, Ish could not only better serve existing clients, but also to attract new course providers with the increased arsenal of features. During the first year since the new platform's launch, Ish saw a 64% increase of its client base. In the following five years, the number of corporate entities using onCourse grew by 300% (compared to their number before the redesign) [1].

References

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