

Leveraging an Enterprise Service Bus with the Banner Student Information System

Introduction

The University of California, Riverside over the past couple of years has been engaged in an important initiative to replace our mainframe based student information system (SIS) with a new SIS based on Ellucian Banner.

It became clear from the beginning that a number of processes, feeds, and other technical components that rely on data from SIS would need to be remediated in order to work in the new manner prescribed by Banner.

Given that an investment had already been made in infrastructure to support web services for UCPATH, most notably an Enterprise Service Bus, there emerged an opportunity to replace legacy SIS processes with an innovative new process that was more “real time.”

Several key processes were ultimately identified. One of the most important is student account provisioning (the syndication of student attributes in downstream identity management systems such as LDAP).

Problem Overview

For many years, most integrations between campus systems has been facilitated through the use of extract or feed files. Applications that use student data within the campus SIS were no exception. One of the most important of these application are the downstream identity management systems like LDAP and Active Directory that use student attributes to generate accounts and authentication credentials that enabled access to the Blackboard LMS, the Growl student portal and many other applications.

Typically, an extract of student data is generated via a batch script running on some schedule such every 15 minutes or even nightly in some cases. This file is FTPed or otherwise transferred to a secondary staging system to be picked up by yet another import script (also running periodically) that loads these attributes into the campus identity management systems.

The implications of these scheduled extracts and scheduled imports is delay and often frustrated students, staff or faculty who are waiting for a name change or some other update in SIS to propagate to downstream systems.

Project Goals and Key Success Factors

Goals

The goal of this project was to increase the customer perceived value of the new Banner SIS by utilizing currently deployed service oriented architecture (SOA) infrastructure in the form of an Enterprise Service Bus to syndicate changes of student attributes to downstream identity management systems.

Key Success Factors

- Significantly reduced time to wait for attribute changes to be reflected in identity management systems
- Decreased complexity of identity management system architecture

Implementation and Technologies Used

Process

Figure 1 below shows a high-level view of flow of data between the Banner Student Information System, the Enterprise Service Bus and the campus identity management systems (identified as IDDB).

As applications sent from Apply UC are processed into Banner, a record is created in a database table within Banner containing various attributes about that student. Ultimately the ESB pulls these records in as they are created and sends them to IDDB.

Figure 2 shows a bit more technical detail of how this works. A Banner component called the Banner Event Publisher (BEP) watches for changes in this table, and then builds a message containing these student attributes and publishes a message into an internal java messaging service (JMS) topic running within a WebLogic app server that is internal to the Banner system.

The Enterprise Service Bus acts as a consumer on this WebLogic JMS topic and moves the message into an ActiveMQ queue that is internal to the ESB.

The ESB checks to see if the incoming student is an employee already (and would already have an account) and enriches the message with the Employee ID if it exists.

A transformation occurs on this message so that it is converted to a format required by the web services running on the identity management system syndicating service (IDDB).

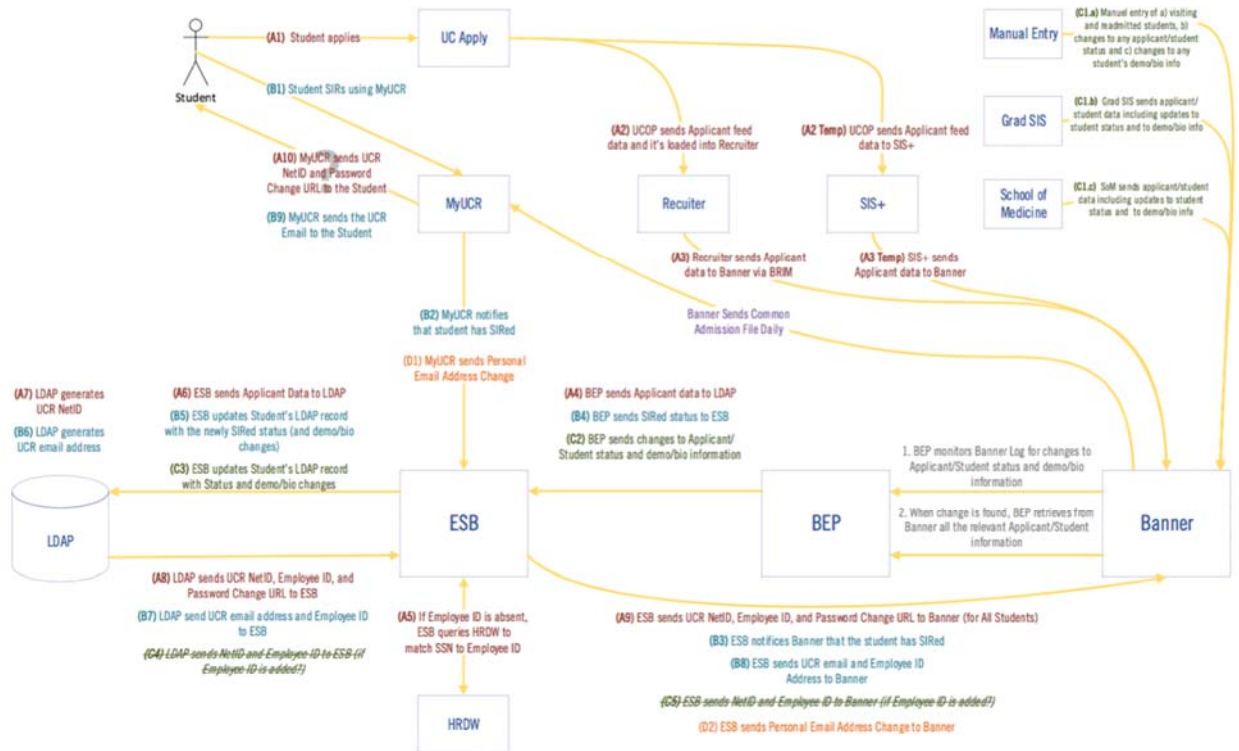


Figure 1 - High Level Process Flow

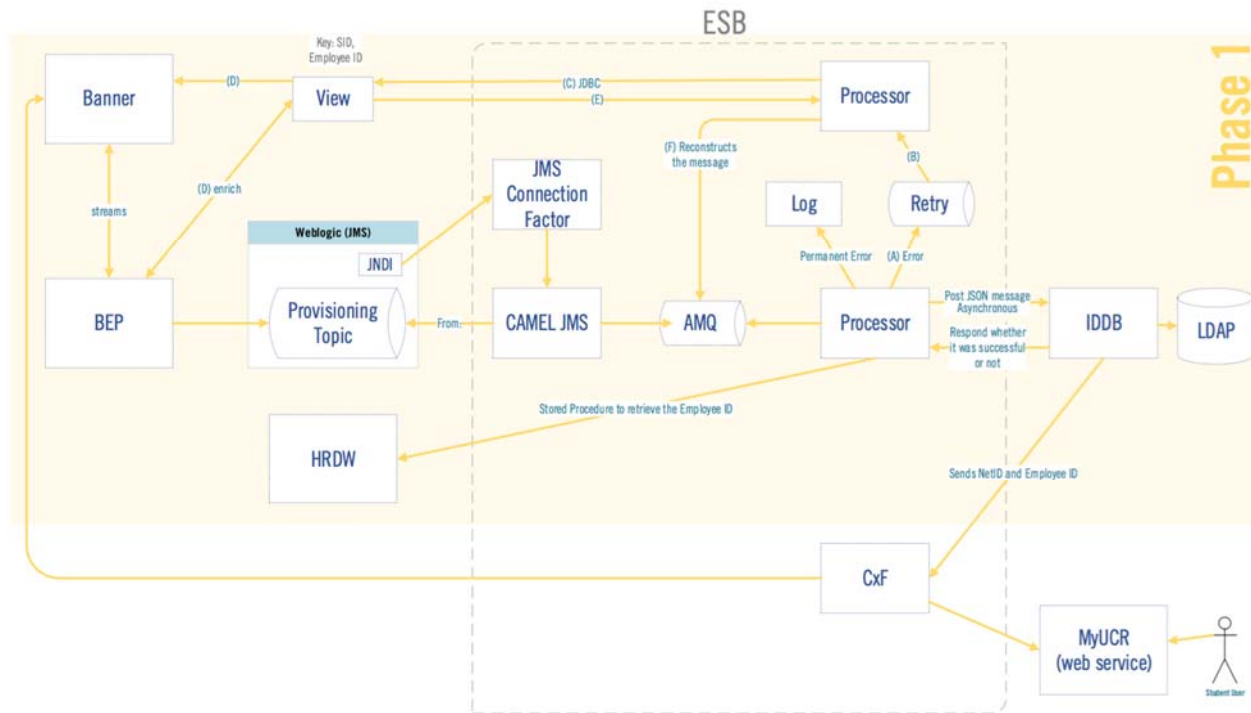


Figure 2 - Technical Architecture

Once the translated message (JSON) is posted to IDDB, the system generates a username for the student (if the student isn't already an employee) and returns that username (NetID) back to Banner.

Technologies Used

- Ellucian Banner running on an Oracle Database
- Ellucian Banner Event Publisher
- Red Hat JBoss Fuse 6.1
 - Apache Camel
 - Apache CXF
 - Apache ActiveMQ
- Apache running Perl scripts (IDDB)
- OpenLDAP

Conclusions

Two key success factors were identified for this project: a significantly decreased time for changes to student data to be reflected in campus identity management systems as well as a decrease in complexity of the student provisioning process architecture.

We feel that both of these key success factors were met. Updates to student data happens in near real time in campus identity management systems without the need poll for changes on some schedule. Additionally, the components to read the extract files, translate and load the data have been removed and have been replaced by “out of the box” components available with Apache Camel.

Many of the patterns utilized here could be very valuable to those campuses that have implemented or are in the process of implementing Banner SIS, since the feed extract pattern that UC Riverside has migrated away from is commonly used across the University of California.

Project Timeline

January 2015	Kickoff of Banner Project – Technical Implementation
August 2015	Kickoff of Student Account Provisioning Remediation Project
September 2015	High-Level Design/Process Flow Completed
November 2015	Technical Architecture Design Completed
February 2016	Banner Event Publisher Upgrade Completed
March 2016	ESB Development, Banner Development Completed
April 2016	Unit Testing Completed
May 2016	Systems Integration Testing
October 2016	Production Deployment

Team

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