

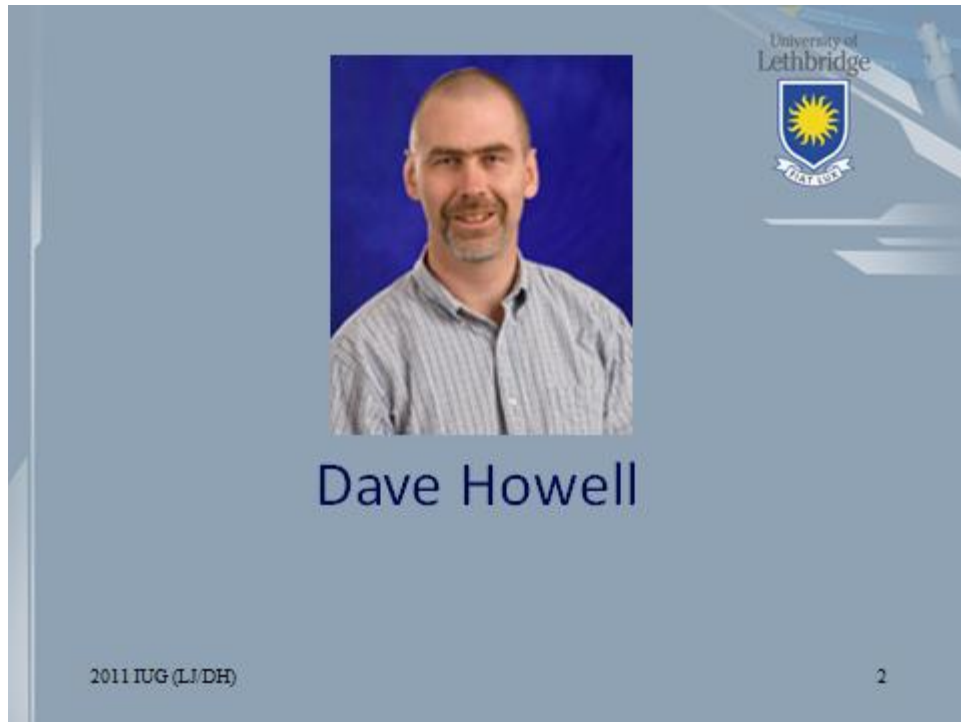
No more lines! The Sequel. Fines Payment Web Services at the University of Lethbridge.

Presentation to the Innovative Users Group 2011 Conference, 2011 April 16

Abstract: At the IUG 2009 Conference, No more lines! (the original) described the implementation of the Patron Update Web Services at the University of Lethbridge for the purposes of facilitating real-time updating of student patron records in Millennium based on updates to the student registration records in the Registrar's Banner student information system. In this sequel, an implementation of the Fines Payment Web Services will be described. The resulting interface automatically transfers fines and replacement charges from Millennium for consolidation onto the students' financial record within the Banner financial system. Challenges to the implementation will be discussed.



Hello and welcome. My name is Leona Jacobs from the University of Lethbridge and the convener of this session.



My co-presenter is David Howell who is not with us today. Up until yesterday, his last day of work with the University of Lethbridge, Dave WAS the Principal Software Engineer in the Enterprise Information Systems unit of our Information Technology department. He is starting a new job in Victoria, BC. Fortunately, he didn't just walk away from this presentation which is a testament to how fortunate I have been to be able to work with him on both the Student Information interface that we presented on two years ago and this fines payment interface.



The presentation today is Dave's and my attempt to encapsulate the conversations we have had in the last 2-3 years with other institutions who have been referred to us by III and thus I am going also follow, more or less, the path these conversations take.

I will begin by describing the University of Lethbridge as context for our local systems integration projects using Millennium's patron update web services and fines payment web services.

In the conversations we have had with other institutions, there has been a certain naivety about web services in general as well as the patron update and fines payment web services that may have been purchased or is being considered for purchase from III or more precisely, the fact that this is NOT an out-of-the-box solution that is being purchased so a bit about web services in general.

The presentation today builds on the presentation Dave and I gave at the IUG 2009 in Anaheim where we described our implementation of the patron update web services and I will be reviewing the mechanics of that interface briefly for you before going into detail about the fines payment interface.

The bottom line is that there are challenges to using these web services which we are all going to have to suffer through unless and until there is a critical mass of us able to lobby III on this subject.

Where the heck is Lethbridge?



Lethbridge is a small city (~ 86,700 in 2010) ... situated in southern Alberta about 1 hour north of the Canada/USA border and about 3 hours north of Great Falls, MT.

Lethbridge (Main) campus ...



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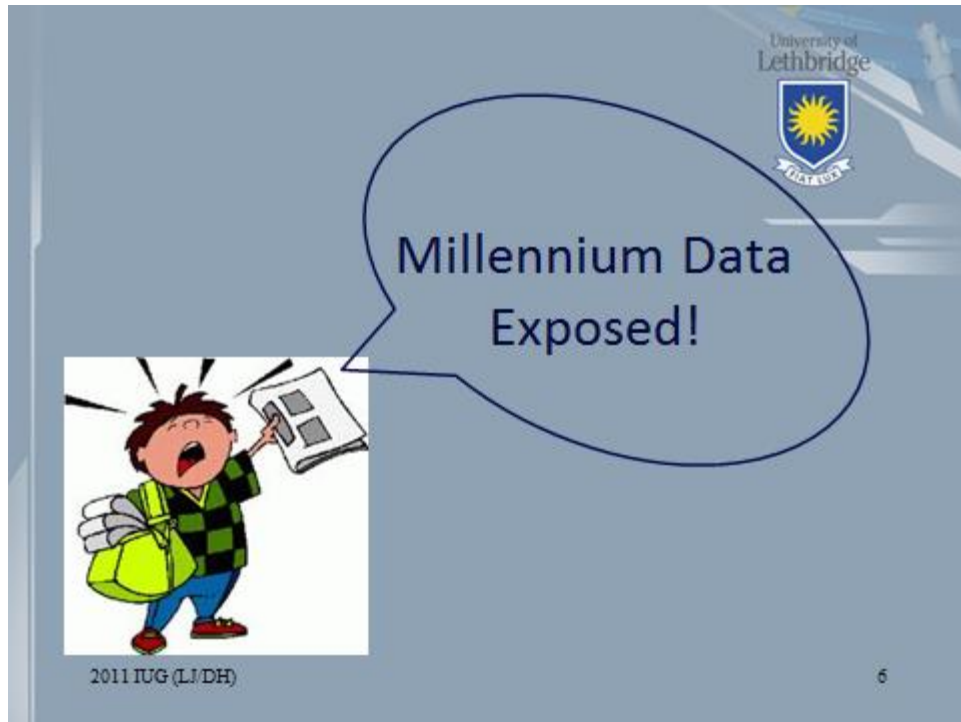
The University of Lethbridge is, itself:

1. Comprised of three campuses: Lethbridge (the main campus)...as depicted in this photo...and in the two major cities to the north of us, Calgary and Edmonton.
2. ~7700 undergraduate students in five faculties and about 500+ graduate students at both the Masters and PhD levels.

The University uses Banner as the basis of support for all of its administrative functions except for the Library which currently uses Millennium.

We have been a customer of III since 1990 (when the contract for Innopac/InnovAcq was officially signed) and we share a system with Medicine Hat College in Medicine Hat, Alberta since 1998'ish.

The integration of the Banner and III systems has been a long standing goal – since the administrative systems overhaul in the late 1980s and early 1990s. So it was with some excitement at this prospect that in 2007 we acquired the Campus Integration Suite which included among other things the patron update web services and the fines payment web services.



In fall 2007, the concept of web services was a relatively new one for academic institutions. It took us at the University of Lethbridge a bit of effort to wrap our heads around this concept. About that same time, Dave was hired and so he was given the task of figuring this out for the rest of us ... “making it happen” on our campus so to speak. His first project was the interface between the Banner (Student Information) system and Millennium using the patron update web services from III.

The first thing to know is that when you purchase the patron update web services and/or the fines payment web services OR any other web services for Millennium, all you are getting is the exposure of specific pieces of your Millennium data (e.g., elements of the patron record in the case of the patron update web services or elements of a financial charge, in the case of the fines payment web services) so that it may be “consumed” or used by an application outside Millennium.

You have to build the means by which the Millennium data will be consumed. Therefore, you need to have some programming expertise at your disposal.

Over to Dave ...



Dave says...



- Web services allow programs on different computers to interact.
- One program is the “consumer” (of web services) and the other is the web services “provider.”

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Web services allow programs on different computers to interact.

One program is the “consumer” (of web services) and the other is the web services “provider.”

Consumer makes requests of *Service Provider*

“Give me some information”

“Do something for me”



Dave says, Web services are...



- Similar to Web browser / Web server interaction over HTTP
 - Typically use HTTP methods: GET, POST, ...
 - GET, form POST => “Give me”, “Do something”
 - Requests and responses are text in HTML format

“In Web services, both parties are programs and the text exchanged is XML, not HTML.”



About Web Services, Dave says...



They ...

- Have modern development tools that make services easy to use.
- Mostly eliminate compatibility issues across:
 - Different OS: Mac / PC / Linux
 - Programming language: Java, C#, Ruby, PHP, ...
- Are a well-established as method of integrating systems

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[Leona: Some of the reconnaissance I did suggested the first introduction of web services happened in 1998. My reading suggested that some better known examples of web services included eBay, Google, Amazon, etc. ... any of those B2B services talked about in the media at the time and in conjunction with the evolution of e-commerce.]



Dave says...



- Two main styles of Web service: REST and SOAP
- PUWS / FPWS are:
 - SOAP Web services
 - Implemented as a single SOAP Web service called Patron I/O
 - Use the *RPC/encoded* style of SOAP
 - are simple to use from Java, C#, etc.

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Dave says...



Patron I/O has several *operations* that access Patron records:

- Create Patron
- Search Patrons
- Update Patron
- Delete Patron
- Pay Patron Fine

BUT ...

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[Leona: At the University of Lethbridge, we use all of these functions except the “delete patron” function.]



Dave says...



★ Just a starting point ★

You need to build the integration solution using
PUWS / FPWS to ...

- Implement your business processes
- Map data (date, address, name)
- Schedule updates as required

... Back to Leona!

Library-Banner Campus Integration Project (LBCIP)



GOALS:

1. Real-time data exchange (or as real-time as we can make it)
2. No (or minimal) staff involvement

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Before I follow up on that last point that Dave made ... web services as simply a starting point, I want to refresh your memories as to what we were trying to accomplish with our system integration projects and use of web services at the University of Lethbridge.

When we started down this path, we had two goals:

- 1) Real time (or as real-time as we can push things bureaucratically)
- 2) No staff involvement (or a minimal staff involvement as we can get things)

The Library-Banner Campus Integration Project (LBCIP)...



- ✓LBCIP (Demographic): contact info.
- ✓LBCIP (Student): Student registration
- ✓LBCIP (Fines): fines payment through Cash Office (students only)
- LBCIP (HR): Faculty/staff registration

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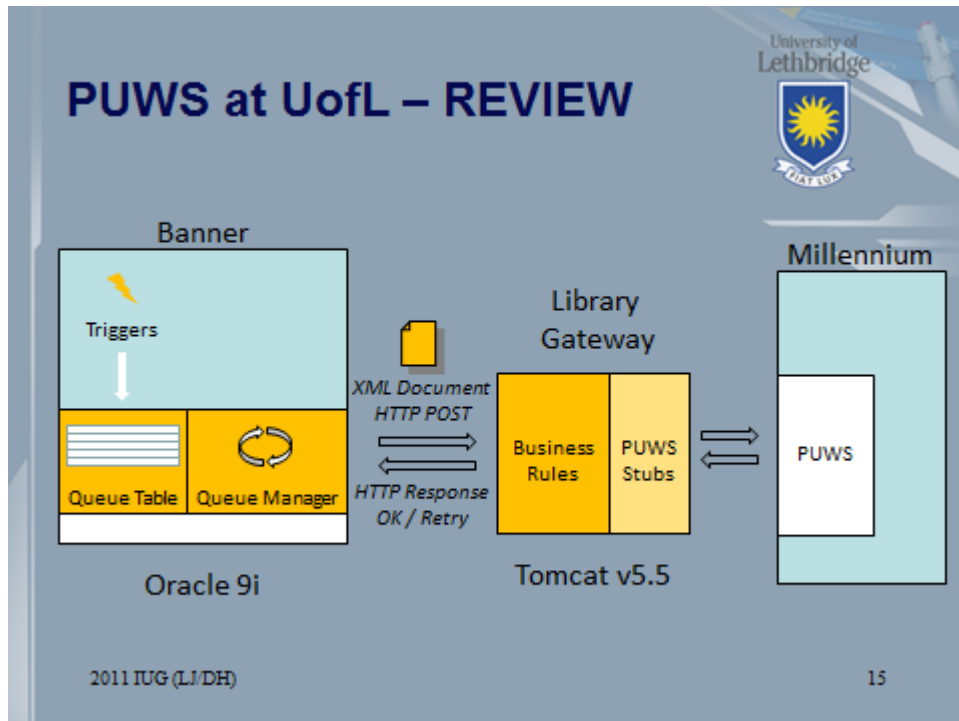
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Our web integration project between Banner and Millennium was laid out in four parts

1. Updating contact information in existing patron records for students, faculty and staff.
2. Creating new patron records for students and updating library privileges for students based upon their course registration.
3. Adding fines and fees owing to the Library to the financial record for a student (or faculty or staff) at the University Cash Office so the patron can pay these fines and fees there along with other monies owed. The payment would then be posted back to the relevant patron record.
4. Creating new patron records for faculty and staff and updating library privileges for faculty and staff based upon their “enduring relationship” with the University. Included is the communication of an “r” (retired) status and a new MBLOCK “d” (death).

The take away message from our experience is that there must be something to be gained by both units. Regardless of service to our communities or efficiencies in communications, unless there is a tangible reward for the unit you are trying to integrate with, your integration project is not likely to move forward. For example, the interface to HR to facilitate registering the privileges of faculty and staff seems to be on perpetual hold. In the case of the interface with the student information system, the Registrar’s Office got on board because their database would become the authorized source of student information. (Without integration, we maintained our own database and as a result, it was a bit of a guess to know which system had more current contact information.) In the case of fines, integration

allowed another automated system to work for the Financial Services people without human intervention.



Before I get into detail about our fines payment integration, Dave and I thought it might be useful to quickly review our integration of Millennium with the Banner Student Information System – the topic of our IUG 2009 presentation. In this integration, students are granted library privileges on a per-term basis, according to their course registrations. They get library privileges as soon as they register for their first course and if they drop their last course, their privileges are terminated.

This slide is a simple illustration of our integration of Millennium’s patron update web services with our Banner student information system.

The main components of the system we have in production are:

- Banner, on an Oracle database,
- Millennium, including the PUWS Web services
- the “Library Gateway” a component we developed as a Java servlet that runs in a Tomcat servlet container

The system needs to process updates from Banner asynchronously (without making the Banner user wait for Millennium to be updated) and it needs to reliably deliver the update so when students add or drop courses or change their personal information:

- changes to Banner are captured by triggers we added to several Banner tables. The only thing the trigger code does is to insert an ID into the queue table.
- triggers in the Oracle database add entries in a table-based queue in the database. Could have been done using a message broker (JMS – Java messenger system) but at the time we had more Oracle skills and this represented a lower-risk option.
- the Queue Manager job polls for queue entries that need to be processed, assembles the XML that the Gateway requires and forwards it to the Gateway. The Gateway is a Java servlet; the queue manager just does an HTTP POST.
- the Gateway handles the Library business rules needed to map data values, determine expiration dates, etc before updating the patron record via PUWS.
- The Gateway searches for, creates and updates patron records via PUWS using generated stub classes to interact with PUWS.
- If the Gateway successfully updates Millennium, it returns an OK response to the queue manager and the update is removed from the queue.
- If the Gateway can't be contacted or for some reason can't successfully process the update, it responds with a request to retry the update later.

Updates are retried every 10 seconds for an hour. If undeliverable at that point they are marked as dead entries, but are retained in the queue.

This approach successfully handles a wide range of outages: the Gateway being off-line while being upgraded or restarted, Millennium backups and upgrades, etc.

Fines Payment @ UofL: Background



Library motivation:

- Challenges in communicating charges to Registrar
- Student reactions to historical charges
- Challenges in collecting through Cash Office

Financial Services motivation:

- APAS – Alberta Postsecondary Application System

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So for a little context, I feel the need to speak to the issue of motivation regarding this particular systems integration project.

For the Library, we had some challenges being part of the University's financial picture while operating in a separate administrative system (i.e., Millennium).

Library charges are required to be paid off prior to graduation and prior to transcripts being issued. However, putting these charges in front of the Registrar, hence the student, was challenging anyway and exacerbated by timing of deadlines, etc. relative to the fact that the student could well still be borrowing and using library materials.

As well, students might return to the UofL to continue their education and find out that they still owed library charges.

Finally, if the student wanted to pay the library charges from a distance using their online banking system, then there was a delay while the Library communicated to the Cash Office what the total amount of the charges were, then the student paid and then the Cash Office communicated back that the charges were, in fact, paid and the Library could mark those charges as paid in the student's record.

Financial Services, hence the Cash Office, was interested anyway but I remember the day that they became very interested and that was with the realization that APAS (Alberta Postsecondary Application System) was automatically going to send transcripts to former students making such requests through the system UNLESS there were outstanding charges owing. All of a sudden, it was imperative to make

sure any library charges were noted on the student's financial record in Banner; there was no longer to be any human intervention in the issuing of transcripts.

Now APAS went live in November 2009 and we didn't go live with our fines interface until November 2010 (although we had some rather blue-sky hope that we would go live earlier than that). That meant that on a daily basis, we would extract two lists:

- 1) One comprised of students with expiry dates later than April 1, 2007 that included ALL monies owing the Library; and
- 2) One comprised of students with expiry dates earlier than April 1, 2007 who owed \$20 or more.

April 1, 2007 was an arbitrary date chosen that made sense when we thought we were going live in April 2010.

These lists were used by the Cash Office to manually maintain the financial records of the students so that APAS could do its job. As you can see, the Financial Services people became as eager as we were to get this system integration working!

**Fines Payment @ UofL:
Objectives of the project**

University of Lethbridge

Consolidate library fines with other student-related University charges:

- To reduce confusion for the student
- To promote a centralized account and payment location.
- To streamline the collection of monies owing the University using existing (and more enforceable) Cash Office procedures
- To facilitate the handling of student account related inquiries

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So in addition to our goals re: integration in general, that is:

- as real-time as possible and
- no human intervention

... we wanted specifically to consolidate library charges with other student-related University charges:

- To reduce confusion for the student
- To promote a centralized account and payment location.
- To streamline the collection of monies owing the University using existing (and more enforceable) Cash Office procedures
- To facilitate the handling of student account related inquiries such as transcript requests, the ability of the student to graduate, etc.

Fines Payment @ UofL:
First you talk ...

Business processes

- Policies and procedures
- Existing system processes
- Workflow
- Definitions
- Requirements of integration
- Options

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If you take nothing else away from this session, take away this message. The time you spend in seemingly interminable meetings discussing and documenting the pickiest details of, what are referred in the lingo of web services, as “business processes” or “business rules” the faster the development time is going to be. The less time you spend on this very important step, as tedious as it may seem, the more you will pay in resolving conflicts later on.

We learned this with our use of the patron update web services to automate updating of student library privileges and contact information. It was worth every minute then and it was worth more than every minute with this interface because of the financial implications involved.

At these meetings, there were two people from the Library (me and a very detail-oriented circulation staff person who also balanced the cash received in the Library); the Manager of Financial Operations and the Manager of Revenue Accounts (i.e., the Cash Office) from Financial Services; Dave who was

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L. Jacobs & D. Howell

engineering the integration and a business analyst assigned to the project to ask all the right questions, to challenge any assumptions, and to insist that jargon be explained.

Discussions of business processes reference, in no particular order: policies, procedures, other systems, how the primary systems work and how the staff work with those systems which usually results in some clarification of what we mean when using particular words or phrases, what is required to meet the goals of the project, what the consumer of the web services needs and what the provider of the web services can provide and how we actually accomplish an integration project.

**Fines Payment @ UofL:
Then you document ...**

- Objectives of the project
- Scope of the project
- Functional requirements
 - General processes
 - Specific rules
 - Data mapping
 - Millennium to Banner
 - Banner to Millennium

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Again, a tedious but a necessary and valuable investment of time. A few years ago, our university IT people adopted a template for what is known as the “business requirements document” or BRD. This template is used to facilitate and guide the discussion and allows the BRD to be written as decisions are made.

The BRD is documentation not only for the developer, but documentation that resolves conflicts in expectations, jogs memories, serves to educate those that inherit the system as people move in and out of positions. The BRD is also used to satisfy any security investigations. In Alberta, our information systems, especially the financial system, undergo government auditing because we are a publicly funded institution. With system integration projects, this documentation is typically requested and must satisfy the auditor’s needs.

I have a copy of our BRD for our fines payment interface here, just as an example of what it looks like and the kinds of things that are included. However the basics are:

1. **Objectives of the project** as a point of referral in case things start to go sideways.
2. **Scope of the project** refers to what is and is not going to be included in the project. Figuring this out and stating it up front means it is less likely (not totally unlikely! ... but less likely) that your system development will wander off-course as additional good ideas and possibilities come to light. Sometimes, however, you cannot state this upfront ... sometimes, you discover the scope of the project as you are involved in this face-to-face process of explaining what seems obvious to others not familiar with the processes being described. However, as you are talking and as you discover what is “out of scope,” then you write that down.

As an example, in this systems integration project as with our student registration integration, we once again **focussed only on the UofL students**, both undergraduate and graduate. This is because our Financial Services unit has no mechanism to collect money from faculty and staff. As well, their imperative was APAS and their work having to manually maintain the financial records of the students. Thus, **faculty and staff were “out-of-scope.”**

We decided, as well, that we would **only focus on automatic charges assigned by the system: fines, bills for replacement, and adjustments**. Manual charges were ultimately deemed “out-of-scope,” not because of any technical limitation but rather because of the history of how the manual charges were used within the Library which made it hard to manage them through the system integration. However, we actually didn’t conclude this until closer to the end of the discussions.

3. **Functional Requirements** literally describes what the systems integration will accomplish in terms of both the general and specific requirements and in terms of the data mapping between systems. In the case of data mapping, when a request is made of Millennium, Millennium, because it uses the SOAP standard of web services, sends back a package of information about a particular charge. Part of the discussion that needs to take place is what information from the package will be mapped across to the other system and where it will be stored. As well, what information will pass back to Millennium and how will that information be stored – noting there are far fewer options in this direction: namely initials (UCO=University Cash Office), paid, and date paid (i.e., transferred).

III Fines Payment Web Services: things that might influence courses of action



KNOW that ...

- FPWS is a by-product of III's e-commerce module.
- FPWS is intended for use by third-party e-commerce system.
- FPWS expects that Millennium will be queried at point of need and updated in response to a specific payment being made.
- NO trigger events possible within Millennium

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As a sidebar, you need to know that there are limitations to the Fines Payment Web Services ... namely that this product is:

- a by-product of III's e-commerce module
- is intended to facilitate use by third-party e-commerce systems (of your choosing)
- the assumption (as per the e-commerce mental model) is that Millennium will be queried at point of need and updated in response to a specific payment being made.
- there are no trigger events possible within Millennium

Now I am going to turn it back to Dave...



Dave says...



Three styles of integration solutions:

1. Periodic batch transfer of the complete set of patrons
2. Periodic batch transfer of those patrons that have changed since some given date.
3. Event-based systems listen for changes, then propagate.

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At the U of L, we have consciously decided to build event-driven integration solutions and have made a long-term investment in doing that. However, other approaches are equally valid. The option your institution chooses depends on

1. Your institution's business requirements
2. What is feasible technically
3. The skills of your IT staff

(LJ) I would just like to add that at the University of Lethbridge, it is key to remember that we are striving to have as real-time integration as possible as a result, which made our implementation of the fines payment interface a tad challenging as Dave will explain. So working through each of these options ...



Dave says...

With respect to batch loading the complete file of patron records (a.k.a. “brute force”):

- Not real time
- Involved too many records
- Required overly-complicated systems of keeping track of who had materials signed out

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[Leona: One option suggested by the III folks was to “walk the database” every night.]



Dave says...

With respect to batch loading the only those patron records where fines had accrued since some prescribed time:

- Patron I/O does not support finding multiple patron records against some condition such as:
 - Find all outstanding fines, or
 - Find all patrons changed since some date
- Not real time; human mediation would be required

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[Leona: This option and the next one, re: event-driven integration are harder to do than they should be, because of limitations to the capabilities of PUWS/FPWS and Millennium generally.]



Dave says...



With respect to event-based systems that “listen” for changes, then propagate:

- Real-time and preferred
- Neither Millennium nor Patron I/O have event trigger mechanisms.

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[Leona: This option, as with the batch load of some subset of patron records, is harder to do than it should be, because of limitations to the capabilities of PUWS/FPWS and Millennium generally.]



“So, at the UofL,” Dave says...



- Investigated various exports and reports from Millennium
- Ultimately chose event-based solution
 - use email notices sent to patrons as events
 - CC’d to an email address used only by this system
 - Notices stored until retrieved for processing
- Paid bills handled as a batch process.

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[Leona: Remember we wanted minimal to no human intervention so we investigated various things like


- Output Bursar (human mediated)
- Output Bursar and Scheduler (Output bursar does not work with Scheduler)
- Scheduler used with create lists (human mediated to change search parameters) but we couldn't get down to the invoice level on that.

We tried setting our RSS feeds up to draw on the patron record database but that didn't work and ILL told us they had not intended RSS to work with the patron records.

Finally we settled on piggy-backing on our circulation notices by having the circulation notices cc'd to a special email address where the notices are stored until they are retrieved for processing. Thus, ...

The part of the system that delivers Fines to Banner is event-driven using automated circulation notices generated on an hourly basis with the Gateway checking for new notices to process every 10 minutes.

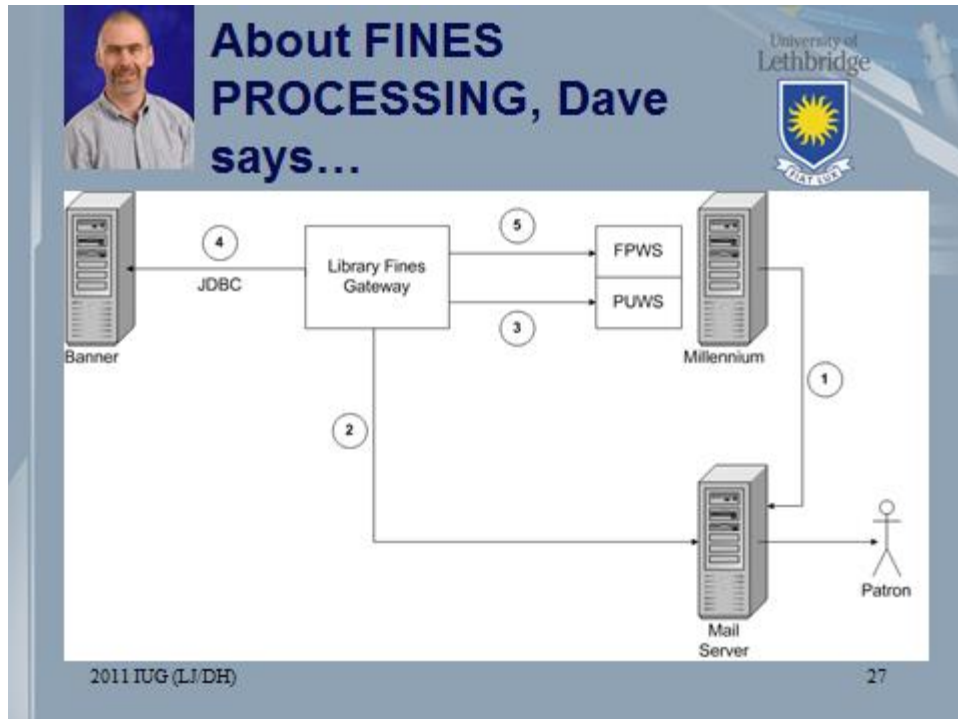
In the case of bills for replacement that are paid, the return loop that moves paid bills to Millennium is a batch process.]



**“So, at the UofL,”
Dave continues...**

- Integration solution is a Java program: **Fines Gateway**
- Runs on a server separate from Millennium and Banner
- Uses PUWS and FPWS to interact with Millennium
- Uses JDBC and JavaMail APIs to interact with Banner and mail server
- Handles:
 - transfer of fines to Banner
 - transfer of paid bills to Millennium

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NOTE: these next two slides as well as a more detailed outline of how we process our fines and adjustments, bills for replacement and our written-off bills for replacement are part of a handout that has been uploaded to the IUG conference website.

Gateway processes fines and adjustments (for returned billed items) events from Millennium as follows:

- (1) Millennium sends fines notices – cc'd to libraryfines.noreply@uleth.ca
- (2) Gateway retrieves fines notice emails periodically – only looks for notices from circadm or aluill (our two Millennium sources) and for notice templates 3x (reserved for use by the Patron I/O – and then captures the UNIVID (now printed on our circ notices) and the Invoice number for the financial transaction of interest.
- (3) Gateway PUWS to collect patron and fines information
- (4) Gateway updates Banner according to business rules
- (5) Gateway pays fines and adjustments in Millennium using FPWS

NOTE: Replacement bills are not cleared at this point

This part of the system is “event-driven”, though there are delays in delivery. Millennium posts fines notices every 1 hour and the Gateway checks for new emails at 10-minute intervals.

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Bills for replacement that are paid at the Cash Office are part of the same Gateway program, but runs as a separate batch process:

- (1) Gateway checks daily for recently paid bills in Banner
- (2) For each paid bill found, check if Millennium bill is still unpaid
- (3) If yes, use FPWS to pay the bill in Millennium

NOTE: Handles student payment of bills and the write-off of bills separately.

This part of the system is not event-driven. Each day it checks for recently unpaid bills (in the last 3 days) and, if they are still unresolved in Millennium, processes them appropriately. Bills will get processed more than once, but they're ignored after the 1st time – this just allows me not to worry if the Gateway fails to run one evening.

We did this as a batch operation because the table that stores student account transactions takes a lot of updates each day and we didn't want to add a database trigger to it.

Back to Leona ...

Challenge: No TEST system for Millennium



Solution:

- Use reserved ID range for test patrons that we mapped to the Banner Test student database.
- Set up unique PTYPE for our test patrons
- Set up special loan rule within minimal allowable time frames for generation of notices
- Setup up special entry in Loan Rule Determiner so any ITYPE + any location + our special PTYPE = special loan rule

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Given that we don't have a test-environment for our Millennium system, testing a fines payment integration like this is a slow process.

First off, I had to set up a mini-environment within our production environment of Millennium. Then, I had to set up test fine events, based upon our requirements document, which are subject to minimum periods to proceed through being overdue, having an overdue notice generated, returning the item and then having a fines notice generated OR waiting for the for fine accrual and notice generation.

And, because it is dealing with financial information, we need to be sure it is working correctly.

Challenge: Commissioning



- Some initial reconciliation of Millennium and Banner required
- Used a export / report of unpaid fines from Millennium
- Text file is imported and processed by Fines Gateway

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We could have arranged to send a large batch of emails to the Gateway, but it turned out to be simpler just to work from an exported file. This mechanism can be used if for some reason we want to revisit a large number of patrons – due to an upgrade or bug fix.

The list we created included students of interest (selected on the basis of their expiry date) owing any money. The report included their University ID numbers (for retrieval in Banner) and their names (as a check) and the amount owing (as a check). The file was uploaded into and processed by the Gateway – a few at a time until Dave, in particular, was comfortable that data was mapping properly (despite the testing we had done!). Linda in Financial Services and I finally told Dave to let 'er rip!

Challenge: Humans

University of
Lethbridge



- Two issues:
 - Re-orienting the students
 - New charges appearing on their Banner financial record
 - Empathy of circulation staff
 - Wanting to backdate billed items – No!
 - Wanting to backdate found billed items – No!
 - Waiving fines after check-in – It Depends!
 - Waiving fines, period – It's a Process!
 - Confusion around manual charges

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One of the interesting phenomena, is that students are actually paying their fines. It started pre-interface when we were manually posting library charges because of the Alberta Postsecondary Application System. Cash Office would report the student had fines ... and the students just paid them. There have been few of these fines challenged.

The second part, and it happened with the student information system integration using Patron Update Web Services, namely getting the staff re-oriented to the system integration and new ways of working.

Challenge: Miscellaneous stuff



- Null check-out dates
- Spurious spaces at the end of the UNIVID field
- Multiple matches on patron records
- Automatic routines in Banner not anticipated
 - Credits on student accounts
 - Semester roll-over and new student loans
- Downtimes
 - SSL certificates, Banner maintenance, Millennium backups, Patron I/O web services.

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Then there are the unforgiving issues of dirty data including such things as null checkout values (we have found a couple of these and we tracked them back to when we changed policy re: maximum fines and did some remedial work on outstanding charges at that time; decided given how few there were and the low value to waive them), spurious spaces in our UNIVID field that a human can't see but a computer does when it tries to match on that data, and multiple matches on patron records. In this case, there can be multiple records created if the student registration system using Patron Update was unable to build a patron record at first try (due, for example, Millennium doing a backup).

We also discovered some routines that have taken place in Banner that challenged our thinking. One was finding credits on student accounts and the automatic application of these credits to the library charges as they are processed. Okay in the case of fines but not so much in the case of bills for replacement! This is a similar situation to student loans in that if there are unpaid library charges on the student's Banner financial record from the prior semester, then when the student loan is received into Banner in the new semester (for the purposes of paying, for example, tuition!), the library charges are first in line to be paid!

And then there is downtime related to the primary systems involved be that downtime related to routine maintenance or the surprise issues of new and different SSL certificates or upgrades that take out the Patron I/O web services. We have asked ILL to make some changes to the Patron I/O regarding these issues and they left us with the impression that it would happen but it has not ... and in the context of IUG recommendations for enhancements, unless and until there is a critical mass thinking about these web services, I am not holding my breath at the Patron I/O being so improved.

Now Dave wants a few last words about systems design ...



On the topic of system design, Dave says...

- Spoof emails?
 - Emails only cause Gateway to review a patron invoice
 - If no balance in Millennium, no action taken
- Multiple payments in Banner?
 - Invoice details determine payment ID
 - Multiple attempts to pay are ignored

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Besides, checking any email notices for where they come from or what template they are using, it is important to note that the email notice is only used to prompt the Gateway to review a particular patron invoice. If there is no invoice to act upon, then no action is taken.

It's an important part of the design of different parts of the system that doing something twice has no undesirable effects. Doing this makes the system simpler to develop and easier to test.



On the topic of system design, Dave says...



- If solution is a distributed system – robustness is important
 - Millennium or Banner may be offline for maintenance or backups
 - Servers upgrades sometimes go wrong
 - Network outages

Our overall solution is a distributed system comprised of several computers interacting over the network so there are things that can disrupt it compared to a program that runs on a single computer. These things need to be considered in the design of the system.



On the topic of system design, Dave says...



- Gateway features
 - Is able to retry delivery of a notice if it fails for some reason
 - Tries to distinguish transient vs non-transient problems
 - Will pause or declare “bad update” if human intervention needed
 - Can send email notifications to support staff

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Human intervention can be needed if the patron record gets locked or multiple matches occur, or if some aspect of the configuration of a server has gone wrong – like an SSL certificate. Besides retry mechanisms we have built in measures to alert the system caregivers that intervention is required.

Fine tuning ...



- Build an standardized and authenticated form to facilitate communication that a charge should be waived.
 - Have the form processed by the Gateway
- Do something about multiple matches on patron records
 - Easy to fix problem but tiresome
- Do something about the interaction of Patron I/O with Millennium backups (which lead to multiple patron records).
- Monitoring (for now) payment of bills re: credits and student loans.

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Now that we are up and running with this integration project, we are aware of some things that we had not thought about despite the meetings upon meetings we attended.

- right now a casual email, human to human, facilitates the waiving of those fines the Library wants to waive.
- better to have specific information captured that the Gateway can then automatically process
- Multiple matches give us grief both with the Patron Update and with the Fines payment web services. It requires a human be notified (it was me but I am passing that torch on!) and the duplicate records deleted to leave only one record in the system.
- My understanding (and observation from deleting duplicate records) is that the multiple records result from the Gateway running squarely into a Millennium backup when it is trying to create a new patron record. Again, we have asked for a fix to the patron I/O to address this conflict but such a fix has not surfaced.
- As mentioned earlier, credits on student accounts and/or the application of student loan monies against bills for replacement are a problem in that bills for replacement are really reminders to the students to bring the materials back ... which they do. However, when they are checked back in, humans don't necessary catch the "missing/paid" status resulting in a number of paid and returned items showing up on our shelves. At this point, we are monitoring the situation to determine how big an issue it really is.

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Questions?

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THANK YOU!

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The integration of our circulation financial system with the student's Banner account has started to pay off ... literally! The Cash Office staff thought there would be more push-back from the students when they found out about the library charges ... students are alerted that there are library charges and asked if they want to pay them. In fact, most students simply pay them. Some students do have a legitimate case that needs to be investigated and I have intercepted some of these at the Reference desk but my impression is that there are not many of those situations and that impression is based on the staff feedback which is virtually none now.

From the student perspective, the integration has made for a more accurate picture of what the student owes the University.

And, it has reduced significantly the amount of work done balancing the revenue from library charges as well as that work done by the Cash Office staff.

No heavy duty photo opportunity... just a good job done.

Thank you and I am happy to field questions ... or channel Dave as appropriate!

