ShelfScan: Streamlining library shelving, expanding quality control

Lauren F. Brown
Yale University, lauren.brown@yale.edu

Jason Zentz
Yale University, jason.zentz@yale.edu

Osman Din
Yale University, osman.din@yale.edu

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STREAMLINING LIBRARY SHELVING, IMPROVING QUALITY CONTROL

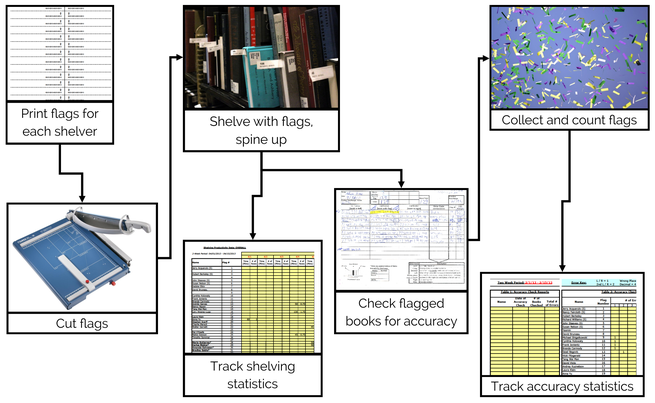
Lauren Brown[1], Jason Zentz[1,2], and Osman Din[3]

[1]Yale University Library Access Services; [2]Yale University Department of Linguistics; [3]Yale University Library IT

ShelfScan, a web-based library collection shelving and scanning application developed at Sterling Memorial Library (SML), is now in use at multiple libraries in the Yale University Library system. It dissociates the shelving and accuracy checking operations, expands quality control through integration with the Voyager catalog database, and provides historical data to aid in operational decisions.

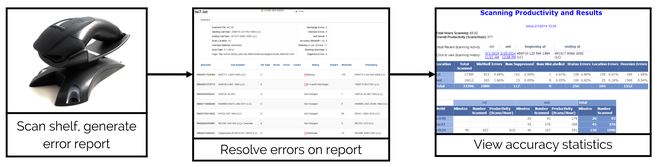
BEFORE

Prior to ShelfScan, when books were shelved in the library stacks, they were first opened in order to insert a paper "recently shelved" flag. Flagged books would be revisited to check call number order only, at which point they would be reopened to remove the flag. This manual accuracy checking did not did not take advantage of the library catalog database (Voyager), so it could not reveal other anomalies such as incorrect collection, incorrect availability status, or catalog discrepancies. In addition, accuracy checking was tied to the shelving process: only recently shelved books were checked for accuracy, and for maximum reliability this checking had to be performed as soon after shelving as possible.



AFTER

Barcode scanning allows the shelving and quality control processes to be performed independently, allowing greater flexibility of scheduling, and it takes advantage of the live data recorded in the catalog. Scanned barcodes are transmitted to a text file, which is uploaded to ShelfScan, which solicits parameters including the location/collection of the scanned material (corresponding to the ITEM_LOCATION in Voyager), whether it is a scan of oversize materials (which are shelved separately in some collections), and amount of time spent scanning. For each barcode, ShelfScan retrieves primarily Holdings (MFHD) and ITEM data (including current item status, etc.) from Voyager in order to find location, status, and catalog discrepancies. ShelfScan builds two virtual files: a File Order Table, which holds the records in the order they were scanned, and a Sorted Records Table, which sorts by call number. In order to identify shelving errors, ShelfScan flags items whose normalized call number is less than the preceding call number in the File Order Table. The two tables are compared to produce a misshelf value for each shelving error. The output is an exception report that staff and students use to resolve all anomalies.



EXCEPTION REPORTING

Scanned File: March 21 scan.txt	**Discharge Errors:** 9
Starting Call Num.: B583 H3313X 1998 (LC)	**Oversize Errors:** 0
Ending Call Num.: B819 .W375 2008 (LC)	**Bad Barcodes:** 0
Scan Location: ccl	**Accuracy (Misshelf > 2):** 6
Oversize Material: Intermixed	**Shelving (+ Lo**
Scan Date: 3-21-2014	**Shelvin**
Page: ht…ages/results.xhtml?id=1109	**Supp**

BT misread as B7 when shelved 5 years ago

SML book on Bass shelves

In Transit On Hold but on the shelf

	Call Numb		LocErr	Status	SizeErr	Mi	Preceding	Enum	Chron.
	B693 Z7 A68 (LC)			In Transit Discharge			B684 M87 (LC)		
	B721 M344 1987 (L			Not Charged			B721 L44 1960 (LC)		
39002013218143	B745 P45 (LC)	0		Not Charged		245	B745 K53 H35X 1992 (LC)		
39002020028547	B765 N53 H513 1989 (LC)	0	sml	In Transit On Hold			B765 N53 I35 1979		
39002000940800	B765 T54 C66 (LC)	0		Not Charged		1	B765 T52 E55 1988 (LC)		
39002000940909	Suppressed B765 T54 C			Not Charged			*B765 T54 C29X 1993 (LC)		
39002015780365	B765 T54 K46 1976 (LC			Not Charged		1	B765 T54 G5413		
39002000148636	B775 C 3 1969			In Transit Discharge					
39002002028547	LB775 M 1976 (LC			Missing		161			
3900201280314	B776 I8 K			In Transit Discharge		5			
390	B780 M3 K	0		Not Charged		1			
	B78			In Transit Discharge					
	B78			Missing		19	B792 .G6513X 2004 (LC)		
	B80			In Transit Discharge			B802 C3713 (LC)		
	B80			Renewed			B804 J2 1977		
03	B818 .W665X 2007 (LC)	0		Not Ch			B830.8 S3333 (LC)		

In Transit but on the shelf

Missing because book is out of order

LB shelved as B because spine label is torn

Suppressed but on the shelf

Charged but on the shelf

TIMELINE AND TECHNICAL SPECIFICATIONS

2011–2012: Prototype development

- single-user Access application

2012–2013: Multi-user web-based application development

- **application stack:** Apache Tomcat 7.x (container), Microsoft SQL Server, SQL Server Reporting Services
- **backend application:** Java (~10k lines of code)
- **frontend interface:** JavaServer Faces

August 2013: Live in production at SML and Bass Library

Summer 2014: Extension to Haas Arts Library and Medical Library

Today: 4 barcode scanners

70,000 items scanned

Items scanned per hour: SML: 310, Bass: 479, Arts: 303, Medical: 902

SSRS REPORTING

History of each scanned section is maintained in an SQL Server database. Patterns of errors can be evaluated to prioritize further scanning activity and develop processing workflows that will maximize error prevention.

Scanning History - Accuracy Summary
by CallNumber Category

Most recent scanning activity: ccl beginning at ending at
Click to view Scanning History: 8/25/2014 1:54 PM DC404 .C368 1977 DD219 H6 R53

Call Number Category	Category Severity	Total Accuracy Errors for Category	Scan Session Severity	First Call Number	Last Call Number	Scan Date	Accuracy Errors in Scan Session	Report ID	NetID
AC5		10		AC5 E83 (LC)+ Oversize	B105 I56 S43 1983 (LC)	3/19/2014	10	1106	tsl7
B105		7		B105 387 F67X13 2002 (LC)	B188 E17 (LC)	3/19/2014	7	1107	tsl7
B1297		16		B1297 L6X 1977 (LC)	B2430 F724 G87 1989 (LC)	3/25/2014	16	1114	kdg26
B188		16		B188 E17 (LC)	B580 L6X 1997 (LC)	3/20/2014	16	1108	tsl7
B2430		21		B2430 F724 L37 1998 (LC)	B3053 H72 E5 (LC)	3/26/2014	21	1119	jfs46
B3092		12		B3092 E5 S34X 1998 (LC)	B3305 M74 C35X 1991 (LC)	3/26/2014	12	1120	tsl7
B3305		18		B3305 M74 D86	B4378 D5 D86 1985 (LC)	3/26/2014	18	1124	jg222
B4378		32		B4378 R44 P64X 1999 (LC)	BF173 L2213 1977 (LC)	3/27/2014	32	1128	kdg26
B583		9		B583 H3313X 1998 (LC)	B819 .W375 2008 (LC)	3/21/2014	9	1109	mb32
B823.3		10		B823.3 B55 1978 (LC)	B1297 L6X 1977 (LC)	3/24/2014	10	1112	nna2
BF1566		8		BF1566 W738X 1996 (LC)	BJ71 N73 1983 (LC)	4/3/2014	8	1136	tsl7
BF173		14		BF173 .L227 (LC)	BF426 W47X 1991 (LC)	3/27/2014	14	1129	cth34
BF431		1		BF431 B3748X 1995 (LC)	BF449.5 N38X 1995 (LC)	3/28/2014	1	1130	jfs46
BF455		12		BF455 A73	BF697.5 B63 A35X 1998 (LC)	3/31/2014	12	1133	er393
BF697.5		13		BF697.5 B63 G66X 1994 (LC)	BF1566 W738X 1996 (LC)	4/1/2014	13	1134	jfs46
BJ182		16		BJ182 A34 1972 (LC)	BL315 E45X 1990 (LC)	4/3/2014	16	1138	cth34
BL1473		18		BL1473 W3 A3 (LC)	BL2747.8 A75X 2003 (LC)	4/4/2014	18	1141	jfs46
BL2747.8		10		BL2747.8 C43 (LC)	BM535 .C39X 2007 (LC)	4/8/2014	10	1143	jfs46

Scanning productivity is captured automatically, providing useful information to library supervisors as they schedule and train staff and student workers. Shelving productivity and shelving turnaround rates are recorded in a related application.

Scanning Productivity and Results since 1/1/2014 3:04 PM

Total Hours Scanning: 127.92
Overall Productivity (Scans/Hour): 371

Location	Items Scanned	MisShelf Errors		Num Suppressed		Num MisLabelled		Status Errors		Location Errors		Oversize Errors		Scan Sessions	Latest Scan	Beginning at	Ending at
ccl	24041	833	3.46%	124	0.52%	1	0.00%	223	0.93%	34	0.14%	11	0.05%	78	8/25/2014 1:54 PM	DC404 .C368 1977	DD219 H6 R53
sml	23355	407	1.74%	38	0.16%	13	0.06%	148	0.63%	41	0.18%	324	1.39%	122	6/18/2014 12:41 PM	HF5001 N554 (LC) Oversize	HF5001 V65 (LC)+ Oversize
Total	47396	1240		162		14		371		75		335		200			

	ccl			sml			Total	
NetId	Minutes	Number Scanned	Productivity (Scans/Hour)	Minutes	Number Scanned	Productivity (Scans/Hour)	Minutes	Number Scanned
aat37				255	1485	349	255	1485
acb88				30	172	344	30	172
ags5				160	726	272	160	726
am2396				45	140	187	45	140
AM30	30	260	520				30	260
angelica	75	749	599				75	749
aom9				70	324	278	70	324
apc2				190	678	214	190	678
bhc9				130	1109	512	130	1109
bjq5				125	575	276	125	575
bwl26				30	74	148	30	74
cch48				20	93	279	20	93
cjv23				90	473	315	90	473
cth34	90	923	615	40	167	251	130	1090

MISSHELF CONSIDERATIONS

- One group of items misshelved together counts as a single misshelf error. For example, if the first six items on a shelf were shelved in the order 4-5-1-2-3-6, only one misshelf error would be reported. The stretches 4-5 and 1-2-3 are both internally in order, so this is counted as a single error, with only item 1 appearing on the exception report.
- Misshelf values reflect both the number of items participating in the error and how many places away they are from their correct place on the shelf (within the limits of the scanned area). In the example above, the misshelf severity value would be 4.
- At this point, ShelfScan considers only items that were scanned. A future enhancement would be to develop its inventory capabilities so that it could compare what is on shelf against what should be on shelf according to the catalog's shelflist.

Yale UNIVERSITY LIBRARY