
The self-education of systems librarians

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Abstract

This article outlines the common duties and responsibilities of systems librarians, and describes how library school students and others interested in entering the field can take advantage of freely available tools to gain relevant experience. It discusses attitudes and traits of systems librarians and their importance to potential and practicing systems librarians. It also lists and describes technologies that people entering systems librarianship can use to gain experience.

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Introduction

It is a given that all librarians must continually learn new skills, new tools, and new approaches to managing and providing access to information. For systems librarians, this basic characteristic of their jobs requires that they respond to developments in technology at a number of levels – they must keep current with what technologies are available (often from outside the traditional library sector), they must evaluate technologies so they can make informed decisions about using those technologies, and they must develop practical plans for implementing those technologies.

Like all librarians, systems librarians receive formal training through pre-service education in library schools, on the job training, and professional development in the form of workshops, courses, and conferences. While this formal training is undoubtedly important, the ability to learn new technologies independently lies at the foundation of systems librarians' professional life, because they often have to use technologies, or make planning decisions about specific technologies, before they become common enough to be the subject of formal training sessions.

People interested in entering systems librarianship have rich opportunities to develop relevant skills, experience, and attitudes outside the context of formal training. This is truer now than ever before: easily available software tools, hardware that is becoming cheaper and more powerful every day, and open standards (many driven by the versatility of XML) allow both students in library schools and new librarians to get practical experience with many of the skills that working systems librarians use every day. Most importantly, developing enthusiastic attitudes and habits toward technology by taking advantage of these opportunities will prepare people interested in systems librarianship for the constant change that will drive their daily working lives throughout their careers.

What is a systems librarian?

Defined briefly, a systems librarian is a librarian[1] who is responsible for managing the



information technology used in a library. This definition is intentionally broad, since the exact duties and roles of a systems librarian vary widely depending on the organizational structure of the library, its size, the number of staff working with the systems librarian, and other factors. A librarian working alone in a small not-for-profit library may consider himself a collections and reference librarian, but when the only workstation in the library needs its network card replaced, he is a systems librarian. At the other extreme, a librarian working as part of a team in information technology (IT) services at a large university library may be responsible for implementing a library-wide digital assets management program.

One of the most thorough explorations of systems librarianship is Wilson's (1998) book *The Systems Librarian: Designing Roles, Defining Skills*, which takes a variety of approaches to defining systems librarianship. Wilson articulates in detail what systems librarians commonly do on the job. He identifies the following to be the typical responsibilities of systems librarians:

- integrated library system management;
- network design and management;
- server and host administration;
- desktop computing;
- training, documentation, and support;
- application development;
- planning and budget;
- specification and purchasing;
- technology exploration and evaluation;
- miscellaneous technology support;
- technical risk management; and
- communication and coordination (Wilson, 1998, pp. 22-35).

Specific skills that he identifies include the ability to use data structures related to library materials, and familiarity with knowledge and classification, information retrieval, desktop operating systems, server operating systems, programming, database design, troubleshooting, and network design and protocols (Wilson, 1998, pp. 37-41).

This list of responsibilities and skills illustrates how comprehensive the job description of a systems librarian can be. Again, the exact combination of these items will

depend on the size and type of library or organization, the skills and responsibilities of others working with the systems librarian, and other factors.

Faced with such a list, someone interested in entering the field could be easily discouraged. It would seem unlikely that a library school student who is not working in a library where she can get practical experience with an integrated library system can get such experience anywhere else. This situation illustrates how taking advantage of freely available tools can allow people to gain valuable experience. There are a number of free or open source integrated library systems (for example, CDS/ISIS and Koha)[2] with reasonable support communities that offer an opportunity to get some experience. They can be installed on a clone PC running Linux or a common version of Microsoft Windows. These systems may not provide all of the functionality of a multi-million dollar commercial product with teams of support technicians and project managers behind it (depending on who you ask), but using them to get some exposure to library systems is certainly worthwhile.

Wilson (1998) makes the point that systems librarians must have a firm, practical grasp of the technologies they use. He devotes an entire section, called "The doing versus the managing" to this issue (Wilson, 1998, pp. 18-21). As he puts it:

Those who just "read" about the technology, as opposed to those who use it, grasp it, and understand it, are destined to be controlled by it ... (Wilson, 1998, p. 20).

Experimenting with a freely available integrated library system as described above, loading some sample records into it, analyzing its limitations and strengths, and using it as a microcosm of larger systems is just one example of how a student would begin to understand this type of technology and, on a small scale, playing the role of a systems librarian.

The education of systems librarians: a brief literature review

Formal training

Pre-service education in library schools, on-the-job training, and professional

development are the main sources of formal training for systems librarians. Although curricula differ widely, most LIS (Library and Information Science) programs offer some sort of training aimed at systems librarianship. However, Xu and Chen (2001) found that only seven out of 49 American ALA-accredited schools offered specializations in systems librarianship or similar focus (Xu and Chen, 2001, p. 319). This relatively small number highlights one of the major challenges LIS schools have, and one of the largest obstacles for students interested in specializing in systems librarianship: most LIS schools by nature provide general education – “across-the-board education” as Wilson calls it (Wilson, 1998, p. 54) – and cannot easily offer specialized programs in systems librarianship. Even though LIS schools have adjusted and are continuing to adjust their curricula to reflect the increased role of technology in general, these changes “are really the purview of all librarians, not just the ones focusing on systems work” (Wilson, 1998, p. 54). Even when schools do focus on systems librarianship, students often cannot take all of the courses that are included in their school’s curricula because the courses are not offered every semester or at times when they can be taken in logical sequence; Xu and Chen (2001) provide evidence from the curricula of the seven schools mentioned above to illustrate this problem (Xu and Chen, 2001, p. 321).

On-the-job training is another common source of formalized learning. Wilson (1998) is quite positive about this form of training, debunking what he perceives as a widely held belief that on-the-job training is second-rate to formal education. As he puts it:

On-the-job-training is not only a reality we must live with, but one that has been reasonably successful (Wilson, 1998, p. 64).

Ironically, the value of on-the-job training underscores the importance of “self education” advocated in this article: without skills and experience, librarians have difficulty getting jobs where they will receive effective workplace training. Therefore, doing all that one can outside of the workplace is very important. Professional development in the form of courses, workshops, and conferences is also out of the reach of many people who are interested

in entering systems librarianship. They may not have the support of employers to help cover the costs of these usually expensive forms of training. Gaining practical experience using readily available tools outside of library school and the workplace is a valuable means of preparing ones self to be competitive in the job market, and indirectly, to take advantage of valuable learning opportunities supported by employers.

Attitudes and traits

One important aspect of systems librarianship is largely absent from most literature on education and training: the attitudes and traits of the systems librarian. Wilson (1998) is one of the few authors who does address attitudes. He identifies the following as “advantageous for a systems librarian to possess” (Wilson, 1998, p. 45):

- flexibility and balance;
- sound judgement;
- curiosity and risk taking;
- follow-through and persistence;
- time management;
- resource management (here, “resources” include people, time, processes, equipment, and data);
- firmness and cooperativeness;
- non-judgemental approach;
- scepticism;
- technical realism (balancing the “cool” with organizational needs and goals);
- analytical, methodical serendipity (adopting a procedural approach to problem solving while crediting luck);
- perspective switching (an “aptitude for and comfort with . . . wide swings in focus” between the details and large picture);
- fire in the belly (i.e. the drive to accomplish things);
- resiliency; and
- technical aptitude (Wilson, 1998, pp. 45-9).

Tennant (1998), in “The most important management decision: hiring staff for the new millennium”, echoes several traits from Wilson’s (1998) list but adds five additional ones:

- (1) “the capacity to learn constantly and quickly”;
- (2) “an abiding public service perspective”;

- (3) "an appreciation of what others bring to the effort and an ability to work with them effectively";
- (4) skill at "enabling and fostering change"; and
- (5) "the capacity and desire to work independently" (Tennant, 1998, p. 102).

Tennant is speaking from the perspective of staff in digital libraries, not traditional systems librarians, but the distinction between the two is somewhat mute. While both he and Wilson emphasize the importance of attitudes and traits, Tennant goes so far as to say that expertise in particular technologies is "the least of your worries" when hiring staff:

... [a]nyone who exhibits the traits outlined above will be able to pick up whatever skill or experience is deemed necessary to perform their jobs well (Tennant, 1998, p. 102).

This undervalued aspect of systems librarianship has particular value to those supplementing their formal education in preparation for a career in the field. Armed with the knowledge that developing these attitudes is important, people interested in systems librarianship can nurture them in conjunction with gaining practical experience and understanding. As stated earlier, practicing systems librarians do not always have the luxury of taking courses in the latest technologies and must draw on other resources in order to evaluate, implement, and manage new technologies within their libraries.

A relevant perspective on the self-education of systems librarians from outside the standard library literature is Raymond's (1999) essay "How to become a hacker", which forms the appendix to his well known book *The Cathedral and the Bazaar* (1999). Raymond boils the skills necessary to becoming a hacker down to three: learn how to write computer programs, install and learn to use one of the open source Unixes (such as Linux or FreeBSD), and learn to use the World Wide Web and to write HTML (Raymond, 1999, pp. 237-41). These three skills alone do not define a systems librarian, although they are all extremely important skills to have. However, people interested in becoming systems librarians should adopt the hacker attitudes that "the world is full of

fascinating problems waiting to be solved" (Raymond, 1999, p. 233) and that:

... to be a hacker you have to get a basic thrill from solving problems, sharpening your skills, and exercising your intelligence (Raymond, 1999, p. 234).

If they do, they will have prepared themselves to take advantage of the resources and tools freely available to them that will allow them to learn some of the technological skills that do define a systems librarian.

Opportunities for developing skills independently

Some skills necessary to systems librarianship are not easily developed independently. It is difficult to become proficient at project management, supervising other people, or budgeting outside the context of a job that requires such skills. However, people interested in entering systems librarianship have many opportunities to gain hands-on experience solving many of the problems that working systems librarians solve every day.

The examples that follow illustrate some of these opportunities. Some may quickly appear dated while others may be relevant for a long time. This short list does not claim to be comprehensive, but only to highlight technologies and skills that are available to people interested in educating themselves.

Operating systems/network administration/security

It is now possible to download from the Internet or purchase cheaply on a CD an enterprise-ready operating system and to install it on a desktop-class computer (actually, it has long been possible to obtain legitimately free operating systems, but the rise of Linux has made doing so commonplace). Linux, FreeBSD, and other operating systems offer the opportunity to gain practical experience outside an institutional setting[3]. The value of these operating systems is that they also allow users to gain insight into network administration and security practices. Proprietary operating systems also offer similar opportunities, but their enterprise versions are often out of the

reach of most people due to licensing restrictions.

Programming languages

Many standard programming and scripting languages can be obtained for free and installed on desktop hardware. Perl, PHP, and Java are easy to obtain, well documented, and have vibrant developer communities, many with library-specific subcommunities such as the active Perl4Lib e-mail list[4].

XML

Anyone interested in systems librarianship must become proficient in understanding and using XML and related technologies such as XML Schema and XSLT (Extensible Stylesheet Language Transformations). XML is being used to deliver content to end users' Web browsers, to structure metadata, and to make heterogeneous information systems interoperate. Learned in conjunction with programming languages described above, proficiency in XML and its applications is arguably one of the most important skills to be had for someone who develops and manages information systems. Tennant's *XML in Libraries* (Tennant, 2002) contains case studies from a variety of libraries and documents the versatility of XML. The XML4Lib e-mail list is the best forum for keeping up on how libraries are using this fundamental technology[5].

Metadata

The versatility of XML and the ubiquitous nature of the Web have made "metadata" a veritable household word. Types of metadata worth exploring include MODS (Metadata Object Description Schema), METS (Metadata Encoding and Transmission Standard), OAI-PMH (Open Archives Initiative Protocol For Metadata Harvesting), and Dublin Core. The relationship between MARC (machine-readable cataloguing) and these newer metadata standards will be one of the most important issues in the near future, particularly as integrated library system vendors start incorporating them into their predominantly MARC-oriented products. Gaining practical experience with manipulating MARC records is more accessible now than ever, since most programming languages have

modules or components specifically designed for this purpose, and there are free or open source tools available for processing MARC records that are in use in all types of libraries[6].

Search and retrieval protocols

Free tools are available that allow people with modest Perl, Java, or PHP skills to write their own Z39.50 clients and targets. The Bath Profile is allowing libraries to put Z39.50 to more effective use by specifying particular levels of interoperability between systems. Z39.50 International: Next Generation (ZING), a group of implementations of Z39.50 using XML, promises to broaden Z39.50's appeal outside the library community. Other XML-based search and retrieval standards will also play an important role in making information retrievable via the Web, especially as XML-encoded content becomes more common and library vendors integrate XML capabilities into their products[7].

Messaging protocols

Related to search and retrieval protocols are messaging protocols. Many of these are documented in book-length or multi-volume specifications, which only the most ambitious and sleepless future systems librarian would read in detail. However, protocols such as the ISO ILL (International Organization for Standardization's Interlibrary Loan) protocols and NCIP (National Information Standards Organization Circulation Interchange Protocol) are worth knowing more about since they are gaining considerable momentum. More generally, protocols such as SOAP (Simple Object Access Protocol) are allowing disparate applications to talk to each other using open standards[8].

Open source/closed source/software licensing

There is a vibrant community within the library world that is developing a wide variety of library systems, from simple Perl scripts to complete integrated library systems. The Open Source For Libraries Web site is a major focal point for this community. Commercial vendors are also seeing the value of releasing source code to their users (for example, IBM strongly supports Linux as an operating system for its servers, and

OCLC has released a number of its products under an open source license)[9].

Trends in ILSs/ILL/electronic reserves systems

Keeping current with trends in library applications such as integrated library systems, interlibrary loans systems, and electronic reserves systems is possible outside an institutional setting through resources such as the e-mail lists ERIL (Electronic Resources In Libraries) and Web4Lib. Vendor sites are also useful, but many do not reveal much detail about their products. ILSR (integrated library system reports), while noticeably out of date, is a very useful resource for technical information on integrated library systems and for sample RFPs (requests for proposals)[10].

Trends in content licensing/copyright

This is an important area that is largely neglected in the literature on systems librarianship. Like all librarians, systems librarians must be aware of trends in intellectual property, but systems librarians are often responsible for developing, implementing, and administering mechanisms for managing licensed information, and for authenticating users of that information. The Liblicense Web site and e-mail list are the best resources for keeping current on trends in intellectual property, especially with regard to libraries and information producers[11].

Online user management

Like intellectual property management, online user management is an important part of systems librarians' jobs that goes relatively unmentioned in the published literature. Yet many systems librarians deal with patron databases as part of their integrated library systems, implement and manage proxy servers and other remote-access solutions, and are stewards of confidential information about how their users interact with their various systems. New initiatives in online user management such as Shibboleth[12] are worth learning more about as information vendors and libraries continue to work out ways to protect license agreements, while making information available valid users regardless of where they are.

User testing

Systems librarians are responsible for developing tools to connect users with information. Knowledge of usability testing, user needs assessment, and accessibility guidelines are important to know about and easy to become familiar with. People interested in systems librarianship would do well to read Norman's *Design of Everyday Things* (2002) and to practice the methods outlined in Neilsen's "Guerrilla HCI: using discount usability engineering to penetrate the intimidation barrier" (1994)[13].

New technologies

As stated above, the list of important technologies supplied here will rapidly appear out of date. A list of current awareness sources on relevant topics would suffer the same problem. However, the informal online community /usr/lib/info[14] is worth monitoring because to a great extent it embodies many of the ideas presented in this article. Describing itself as a "concerted effort to infuse librarians with the hacker spirit," /usr/lib/info is an excellent forum for tracking emerging technologies, particularly trends in metadata, interoperability protocols, open source and propriety library software applications, and technologies from outside the conventional library environment. Anyone interested in library systems should monitor this site closely.

Conclusion

People who are interested in becoming systems librarians and are outside a traditional institutional setting, are not necessarily in a position to develop project management, supervisory, and teamwork skills. However, opportunities for developing other types of skills – in particular many of the practical technical skills that are so important to systems librarianship, are open to anyone with a connection to the Internet and a motivation to learn. At least as important as technical skills are the attitudes and traits necessary to deal with constantly changing technologies.

Notes

- 1 The issue of whether it is necessary to have a professional librarian in the position of library systems manager is debated elsewhere; for example, Graeme Muirhead's compilation *The Systems Librarian: The Role of the Library Systems Manager* (1994) devotes an entire section to this question.
- 2 CDS/ISIS: available at: www.unesco.org/webworld/isis/isis.htm; Koha: available at: www.koha.org/
- 3 Linux: available at: www.linux.org/; FreeBSD: available at: www.freebsd.org/
- 4 Perl: available at: www.perl.com/; PHP: <http://www.php.net/>; Java: available at: java.sun.com/; perl4lib: available at: www.rice.edu/perl4lib/
- 5 XML: available at: www.xml.com/; XML4Lib: available at: <http://sunsite.berkeley.edu/XML4Lib/>
- 6 MODS: available at: www.loc.gov/standards/mods/; METS: available at: www.loc.gov/standards/mets/; OAI: available at: www.openarchives.org/; Dublin Core: available at: <http://dublincore.org/>
- 7 Bath Profile: available at: www.nlc-bnc.ca/bath/; ZING: available at: www.loc.gov/z3950/agency/zing/; XML-based query languages: available at: www.xml.com/pub/rg/XML_Query_Languages
- 8 ISO Interlibrary Loan standards: available at: www.nlc-bnc.ca/iso/ill/; NCIP: available at: www.niso.org/standards/standard_detail.cfm?std_id=728; SOAP: available at: www.xml.com/pub/rg/SOAP
- 9 oss4lib: available at: www.oss4lib.org/; OCLC's open source software: available at: www.oclc.org/research/software/
- 10 ILSR: available at: www.ilsr.com/; ERIL: available at: www.topica.com/lists/eril/; Web4Lib: available at: <http://sunsite.berkeley.edu/Web4Lib/>

- 11 LibLicense: available at: www.library.yale.edu/~llicense/
- 12 Shibboleth: available at: <http://middleware.internet2.edu/shibboleth/>
- 13 Guerrilla HCI: available at: www.useit.com/papers/guerrilla_hci.html
- 14 `/usr/lib/info` is named after a standard UNIX operating system directory. The URL for the site is <http://usrlib.info/>

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