Online Collaboration for Theater Design and Production at The University Of Cincinnati, College-Conservatory of Music

By

Eric Holtel

Submitted to
the Faculty of the Information Technology Program
in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Science
in Information Technology

University of Cincinnati
College of Engineering and Applied Science

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________________________________________  __________________________
Eric Holtel                             Date

________________________________________  __________________________
Annu Prabhakar, Faculty Advisor        Date
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Abstract

The SharePoint solution for the College-Conservatory of Music at the University of Cincinnati will be a robust and flexible solution for uploading, sharing, and obtaining feedback on collaborative works. The department in which this solution will be most heavily used will be the Theater Design and Production department (or TDP), for the purpose of planning and executing theatrical productions. The need came about when the Stage Managers came to us, (the CCM IT Department) because they were having trouble sharing information across different electronic mediums such as email, Google Docs, Wiki sites, online file sharing services, (e.g. DropBox) as well as physical mediums like corkboards. My proposed solution would use SharePoint from Microsoft to address all of these problems and combine the functionality of all of the electronic mediums into one, all-encompassing solution that could be controlled in-house.

CCM has limited resources for support of a final product, as well as a rotating staff of stage managers that will be the primary users, so the final product will need to be easily understood and maintainable for future use. Final project deliverables will also include documentation on how to operate, configure, and support the system so that future users can benefit from the lessons-learned by me throughout the project. By using software already purchased by the college, and free options offered by Microsoft, I hope to keep the final solution as low-cost as possible, and with minimal support required by the IT Department.
1. Project Description

1.1 Problem Statement

Currently, the solutions in place do not provide adequate maintainability, rapid deployment, notification, collaboration, or organization to keep all members informed about the developments on a project or show. Current devices in use include: CCMSpace (file server), Blackboard, Wiki sites (located on UC FileSpace or third-party Web sites), Google Docs, production meetings, and cork boards located throughout CCM. Many different groups work on a show at a time and needs to be updated of other groups’ progress. During any given production, Information sharing needs to occur between any number of the following groups: Stage managers, lighting, scene shop, sound, instrumental groups, wig and makeup, costuming, instructors, students, actors, support staff, box office and Performance Management. This project would provide all groups the ability to add their own content to a web-based collaboration tool, and allow others to view or modify content in a structured, organized way. This would cut down the time spent in production meetings, sending emails, updating wiki sites, and locating pertinent information.

Currently, one process for sharing information among other stage departments is production meetings. In these meetings the stage managers and designated leaders from other parties working on a production will discuss needs, deadlines, rehearsal schedules, and other matters. The notes from these meetings are taken down and shared with others via cork boards and wiki sites that the stage managers generally maintain. A similar process is used for sharing rehearsal notes, where issues encountered during a rehearsal are taken down and distributed to those parties responsible for resolving issues. Often
these issues deal with technical aspects of the production like props, lights, or costumes. Stage managers will be charged with disseminating this information as well by emailing point people or the responsible parties must check the cork boards after a rehearsal for any notes. This leaves a lot of room for missed, misdirected or delayed communications that can stall problem resolution.

Sharing and updating schedules is another challenge experienced by many different divisions within a production. For example, all actors must be fitted for costumes, wigs and makeup to ensure a good look for tech rehearsals and shows. Often, actors will miss an appointment putting these workers behind, or costume designers will need to adjust times on occasion to fulfill additional needs. Students also need to attend a certain number of rehearsals, meetings, or work a certain number of hours on a production to fulfill course requirements.

1.2 Description of Solution

The Microsoft SharePoint Server would replace the need to maintain several wiki’s, Web pages, file stores, and cut down the need for emails and redundant communication channels. It will be aimed at fulfilling the needs of students, faculty, staff, and administrators of the Theater Design and Production department at CCM as well as providing an insight to the program for prospective students and visitors to the site. SharePoint offers a content-rich experience for users and visitors that facilitates communication and collaboration of many diverse groups and could be further expanded later to include the rest of the departments within the college.
The solution would be hosted using IIS 7.0 on a server running Windows Server 2008 Standard edition. Data will be stored using Microsoft SQL Server 2008, and the SharePoint 2010 Foundation server will be used instead of the Standard or Enterprise edition because of cost limitations.

The Web site will utilize custom templates designed using the included editor and Microsoft SharePoint Designer 2010, which is available for download from the Microsoft SharePoint website. The design themes and elements will be taken from the existing resources at CCM, such as the CCM homepage at http://ccm.uc.edu, UC’s Web content management system, and artistic resources provided by the college, such as pictures, videos, and multimedia content.

The editing features included with SharePoint will be used to by students and faculty to customize the content on their respective pages by means of the WYSIWYG editor available through the Web page itself, and the file manager that is also included with SharePoint.

1.3 User Profiles

There will be 4 different kinds of users that are involved in this project: visitors, students, faculty, and administrators

1.3.1 Visitors

Review what is going on in the program. Check out progress on productions, review student and faculty profiles that are linked to the CCM Web site. This group is the most diverse and computer experience will vary greatly.
1.3.2 Students

Students are generally students working on a production in a performing role or a technical role. These students are all familiar with how to use Microsoft Office, and interactive websites such as BlackBoard, Facebook, or similar Web sites. As technical experience varies with how to create and edit Web pages, this process will need to be as easy and straightforward as possible, as mostly stage managers and students in different production areas will be the primary contributor of new and changing information.

1.3.3 Faculty

Faculty members have a good idea on how to use interactive Web pages such as BlackBoard and online grading solutions already in place. Their role will be to contribute some new information, but mostly they will be overseeing the work students do and will provide feedback for continuous improvement. Eventually, they will need to assign students a grade and gauge their progress within the program. Faculty will not generally create new pages, but may as need changes, so they too will need to follow the documentation provided and will need a simple process to follow.

1.3.4 Administrators

Administrators more specifically are the system administrators and support personnel at CCM that will need to support this solution in the long run. They include 1 systems administrator who is well versed in web and server administration. Other support personnel include a technology coordinator who has experience in system administration, and a co-op who will be cycled and vary in technical knowledge but will be able to answer to any basic troubleshooting with the system.
2. Design Protocols

Figure 1. Use Case Diagram

The users of this system as explained in the “User Profiles” section on this report fall into 4 primary groups able to perform the actions as indicated in Figure 1.
Figure 2. Application Diagram

Figure 2 shows the interaction between the different server technologies: SharePoint Server Foundation 2010, Microsoft SQL Server 2008, and the different hierarchical levels of the website. Each server farm may contain any number of items below it in the diagram. Each server farm is expandable to include multiple servers, instances, databases, Web applications, and Site collections.
Figure 3. Network Diagram

This diagram indicates the (simplified) network layout that is sensitive to the context of the project. The center blue bar represents the UC internal network, the black lines indicate 100Mbps Ethernet connections and the lightning bolts represent the ISP connections. Users above the firewall represent internal network users, and the laptop to the bottom, left represent external VPN users.
Figure 4. Site Hierarchy

The Web Site will have 3 primary hierarchical levels, one Portal or Master site, one-to-many Site collections used for each production, and finally one-to-many sub-sites for each individual section of TDP.
3. Project Objectives

Objectives of the project included the following:

1. Running SharePoint Server
   a. Supporting SQL Database
   b. Application Server
   c. Web Server supporting SharePoint

2. Starter Web Pages
   a. Home Page
   b. Full Page Hierarchy
   c. Department/Section Pages
   d. Current Production Pages

3. Page Templates
   a. Ability of End-User to create new production pages
   b. Ability of End-Users to create Departmental pages

4. Supporting Mechanisms
   a. E-mail Notifications notifying users of pertinent events
   b. User feedback/Blog tools
   c. Automated Backup/Restore transparent to End-Users
   d. Remote Web Administration
   e. Secure authentication integrating existing Active Directory
   f. Automated logging and event notification

5. Documentation
   a. End-User Documentation
      i. Creating new pages
      ii. Configuring pages
      iii. Adding/Modifying content
      iv. Deleting Pages
   b. Administrator Documentation
      i. Configuring Backup/Restore
      ii. Adding/Deleting Pages
      iii. Changing Page layout
      iv. Configuring logging and notification
      v. Monitoring overall system health
4. Project Planning

4.1 Timeline

Figure 5 shows timeline was used with development taking the majority of the time, beta (field testing) was completed as features are finished and deployed.

4.2 Budget and Resources

<table>
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<th>Projected Cost</th>
<th>Actual Cost</th>
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<td>Microsoft SharePoint Foundation 2010</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<tr>
<td>Microsoft Server 2008 Standard</td>
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<td>$0</td>
<td>$800</td>
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<td>Visual Studio 2008 Professional</td>
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<td>$898</td>
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<tr>
<td>SQL User/Device CAL</td>
<td>$164</td>
<td>$0</td>
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<tr>
<td>Physical Server</td>
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<td>$0</td>
<td>(Varies Greatly)³</td>
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<td>SharePoint Consultation Fees</td>
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<td>$0</td>
<td>$10/hr x 200 hrs = $2,000 (Student)</td>
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<td>Totals</td>
<td>$12,379</td>
<td>$0</td>
<td>$3,862</td>
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Figure 6. Project Budget.
This budget shows the projected cost based on Microsoft retail prices available on the date of proposal, the actual cost that will be incurred to the college for the purposes of completing this project, and finally the cost to the college based on academic licensing and reuse of existing licenses for the purposes of putting SharePoint 2010 into production.

The Server hardware estimate was omitted since the cost can vary greatly depending on the production environment that could be selected. Since an existing server will be used, no additional hardware was purchased for the purposes of this project.

4.3 Hardware Specifications

An existing Lenovo A52 with a Pentium D dual-core processor, 4GB of RAM, and 250GB of hard disk space were used for this project for hosting the SharePoint Server for development purposes. A production environment had not yet been determined and could vary greatly depending on final specifications including: projected uses, use of UCit Hosting solutions, virtualization technologies implemented, and assignment of physical hardware resources.
5. Proof of Design

The following figures show that the SharePoint Web Site is running and shows the layout of a typical show page within the Internet Explorer web browser. Other screen captures and figures have been provided to show the deliverables of the project have been met.

Figure 7. Main Production Page

Figure 8 is a screen capture of the running production Web Page for Rent. It shows the working parts of an individual production Web Page including the “Shared Documents” space, the “Calendar”, “Announcements”, “Getting Started”, and the “Top Bar” indicating the sub-Sites within the Rent production page.
Figure 8. “Site Actions” Menu

Figure 8 shows the individual actions that a Site Administrator can perform on a page. It changes dynamically based on the permissions the current user has for the page they are currently accessing. Fewer features are available for users with permissions lower than Site Administrator, and may only include: “Sync to SharePoint Workspace”, and “View All Site Content”. The interface is reminiscent of Office 2010 and many other applications adopting the “Action Button”, and “Ribbon” style interface.
Before any user can access the SharePoint Site, an Active Directory (AD) account must be created for them. This process is automated already and an AD security group is added to their account when it is created for them. The designated AD security groups determine the permissions of the user accessing the individual Web Pages. Figure 9 shows that an authentication window has popped up indicating that the user is trying to access a SharePoint Web Site that requires authentication. We can also see from this figure that “CCMSHAREPOINT” is a member of the “conservatory.uc.edu” domain which is where both the SharePoint server and the AD server reside. Local machine accounts can be used on the server as SharePoint accounts as well, but this was to be avoided for security purposes. After the user is authenticated, the title bar displays their full name as specified in Active Directory. (See Figure 10)
In order to accomplish the goal of making the site easy to use and also easy on the systems administrators, site templates were created and the ability for users to create their own sites from those templates was added into the Site functionality. This was first accomplished by changing the security settings for certain users to be able create new Site Collections for each production. I then created a template that can be used so the user does not have to start creating a page from scratch. Tips and links were included in the template to guide users on how to customize the page. Figure 11 shows the new Site options and the custom template is highlighted. Furthermore, Figure 12 shows the new Site collection that is generated from the template.

Figure 11. TDP Production Template Highlighted
Listed in the deliverables is the ability to notify users of users to be alerted by email of any pertinent events. This was accomplished by configuring SharePoint to forward E-mail messages to UC’s Simple Mail Transfer Protocol (SMTP) server. This was done to avoid using a third-party server and setting up a local SMTP server that would potentially be black-listed by either of UC’s E-mail solutions for appearing like spam. Figure 13 shows an item where an alert can be set using the “Alert Me” option circled in red.
Figure 13. Alert Example

Figure 14 shows the E-mail that was generated when the Announcement in Figure 13 was created. The Site will only send an E-mail to the address that is supplied by Active Directory. SMS notifications can also be configured, however they were not considered for this project because it required a paid subscriber service.

Figure 14. Notification E-mail
Backups are automated using the Enterprise backup solution currently in place at CCM. Site collections, server state, user files, and the SQL database are all backed up nightly to tape and tapes are rotated in a fire-proof safe on a regular weekly schedule. Logs are kept by the system, SharePoint, and SQL Server on the systems where their respective services reside. Logs may need to be checked and purged periodically to free up disk space, otherwise log management has been configured to catch pertinent events and SQL Server logs are maintained and purged automatically by its integrated “garbage collector”.

Remote Web administration is provided via a separately authenticated port on the SharePoint server and provides access to the most common administration tasks. A server administrator may need to intervene occasionally to purge or archive old sites, investigate end-users’ errors, or perform other maintenance on an as-needed basis. Figure 15 shows the separately authenticated administration page.

![Figure 15. SharePoint Central Administration Page](image)
6. Testing

Testing was completed on 3 operating systems: Mac OSX 10.6.7 (Snow Leopard, Service Pack 7) and Windows XP (SP3), and Windows 7. Browser testing included Internet Explorer 8, Firefox 3.6, and Safari 5. Primary functionality was confirmed with all browsers including making sure features like page editing, primary ribbon functions, and upload/downloading files all worked. Visual discrepancies occurred when using browsers or operating systems that did not support or did not have Silverlight. These problems were mostly cosmetic and required SharePoint to fall back on legacy technologies to support features like upload/download dialogue boxes, menus and authentication boxes. For example, Figure 16 shows where a menu has changed to allow users not running Silverlight to still access the basic features of the site.

Figure 16. Menu with Silverlight Missing
Prior to tech expo and presentations I, personally went through whole web application in order to remove orphaned sites and site collections, remove or redirect dead links, and eliminate “File not found” errors. Many of these were orphaned sites created early on in order to test the functionality of self Site creation features and verify user permissions.

User testing involved exposing the stage managers to the Site and garnering their feedback. Using their feedback I improved the placement of links to make it more intuitive to them, and adding the help section to the SharePoint site itself.
7. Conclusions and Recommendations

I believe that this project both shows Proof-of-concept that a SharePoint solution can fulfill the needs of the Stage Managers to communicate with different departments within TDP on individual Productions and provides a shovel-ready solution for CCM if, and when they decide to move forward with putting such a solution into production. I believe that the turn-key templates provided with this project can be taken and modified to best serve the needs of not only the TDP department, but other sections of CCM as well, including Information Technology, Administration, Admissions, and others. Once this solution is in place, it can be easily expanded and used to better utilize the full abilities of Microsoft SharePoint technologies. This project, utilized properly, should help fulfill the commitment that CCM and UC as a whole has made to utilizing technology in the classroom, and giving real-world exposure to experience and technology that is currently being used in the workforce.
References


Notes

1. Department/section pages were removed from the deliverables with consultation from the technical advisor. It was determined to be beyond the scope of this project, and eliminated to keep focus on TDP.

2. Visual Studio was never used for the final project deliverables and is not foreseen to be needed for production purposes. Therefore it has been removed from the budget.

3. Price of a production server varies greatly depending on final specifications of the site, make and model of server, virtualization technologies used, and any needed peripherals and incidental costs. At the time of publication, a definite hosting solution for production was not yet finalized by the department.