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SharePOINT FOR HEPS TECHNICAL SYSTEMS AND PROJECT MANAGEMENT

X.H. Wu†, C.P. Chu, L. Bai, Institute of High Energy Physics,
Chinese Academy of Sciences, Beijing, China

Abstract

High Energy Photon Source is the latest planned synchrotron light source in China which is designed for ultra-low emittance and high brightness. The accelerator and beamlines contains tens of thousands of devices which require systematic management during their construction and operation. It is also necessary to capture project management information systematically. HEPS chooses the Microsoft SharePoint as the document tool for the project office and all technical systems. Additionally, Microsoft Project Server on top of SharePoint is used for the project management. Utilizing the SharePoint and Project software can facilitate a lot of daily work for the HEPS project. This paper describes the SharePoint and Project server/client structure and various applications been developed so far.

INTRODUCTION

In Recent years, the Institute of High Energy Physics (IHEP) has launched several "big science" projects, which require high-efficient management and project control in order for on-time and within budget goals. However, the use of modern collaborative work platform is not accustomed in these projects. Most IHEP employees are used to traditional ways such as e-mail and standalone project management tools to perform daily work. The old working ways may be suitable for small or medium research projects but definitely not good for big projects. On the other hand, in the past twenty years, many IT tools have developed to ease our daily work. It can be very beneficial to look into these solutions and pick up suitable tools for our projects. SharePoint [1] based office and project tools are good candidates for IHEP initial IT upgrade work.

A 4th generation synchrotron light source features ultra-low emittance and high brightness, the High Energy Photon Source (HEPS) designed by the IHEP, has started its construction since June 2019. There are about 500 members in HEPS project which includes 5 technology divisions and 50 engineering systems. During the construction phase of HEPS project, more than 20TB size documents will be generated, about tens of thousands professional project tasks will be tracked. Each HEPS's member needs to visit or update documents and project progress frequently. In order to achieve these works accurately and efficiently, it is necessary to build a modern Technical Systems and Project Management Platform.

The purpose of this work is to provide a modern service platform for HEPS project. This paper present the system design and platform development. Members within the project whom are authorized with appropriate permissions in a HEPS resource pool database. With this right permission, one can share and manage his/her project data, documents, photo and other resources to improve work efficiency. Meanwhile, this platform also provides many powerful features such as advanced search and analysis functions through which users can find useful information quickly and then make reasonable decisions accordingly. Additionally, this platform provides Project Web App (PWA) application which allows multiple users to work collaboratively and coordinating effectively on planning, tracking and updating the status of HEPS project.

ARCHITECTURE

System Structure

As shown in Fig. 1, the architecture of HEPS SharePoint includes three layers: network layer, application layer and data layer. The servers in the network layer interacts directly with users, is responsible for publishing the proxy site, processes and forwards all requests from the users, and isolates users and data. Users need to access SharePoint Web Front End (WFE) runs through this layer to achieve security control, load balancing, etc. The network layer cannot directly access data layer and can only be accessed through the application layer. The WFE and APP servers of SharePoint are built at the application layer. The WFE servers are responsible for handling users' requests, and the APP server are used for all running background services. The date layer is used to store most of the system data and user data. There are firewalls between the layers to ensure the independence and security of each layer.

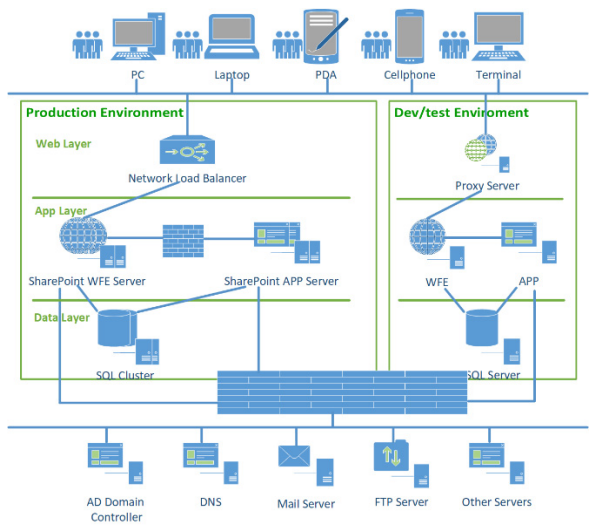

Figure 1: Structure of HEPS technical systems and project management platform.

* Work supported by the National Development and Reform Commission, City of Beijing, and the Chinese Academy of Sciences.
† wuxh@ihep.ac.cn

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HEPS currently has two SharePoint environments: production environment and development/test environment. The production environment has two WFE servers, two APP servers and one database server. The two WFE servers are used for load balancing among nodes that are routinely used. The APP services needs to use more resources, so we have one search server and one other APP server. The data layer contains one database server (planned to be replaced with a database cluster to improve usability). The dev/test environment includes one WFE server, one APP server and one database server because of less data and access. The two sets of environments do not affect each other.

Site Structure

Generally, there are three kinds of site hierarchy model as bellows which depend on various factors [2].

- Each department has its own site collection.
- Single site collection and all department sites are sub-sites.
- Single site collection and all departments are organized into a hierarchy of sub-sites according to functions.

As shown in Fig. 2, first, considering that HEPS is a medium size organization, we choose one site collection; secondly, HEPS have several departments, such as project site, documentation site and so on, these sites reside the second level of HEPS homepage; thirdly, there are five main technical divisions in HEPS, we have created many sub-sites in the low level. At the same time, we have created a site collection 2 which has disabled the ability to save site as a template to achieve publishing feature.

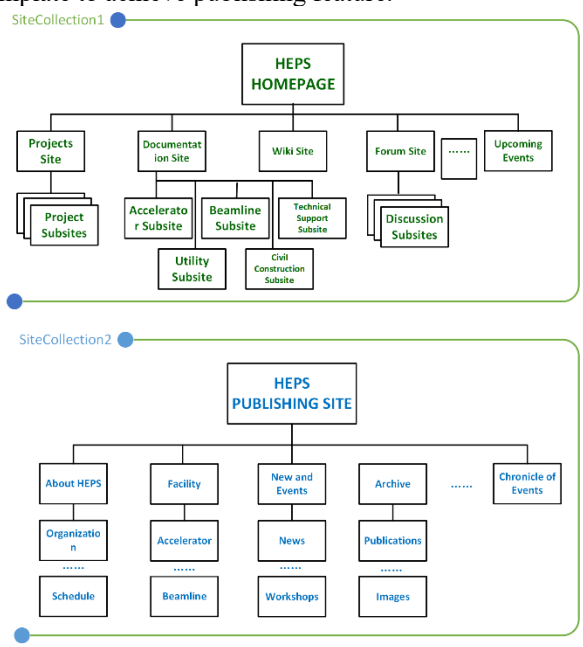

Figure 2: HEPS site collections.

CURRENT STATUS

HEPS Introduction

The HEPS Introduction page presents the brief introduction of HEPS project. From this page, we can see the design sketch of HEPS shown in Fig. 3.

Figure3: HEPS introduction webpage.

Documentation

During the progress of HEPS project, many technical documents, meeting minutes, design reports, technical notices, etc. will be generated and saved. These documents will initially be in different places, which makes it very inconvenient to find. After a period of time, due to too many files, it may cause some documents to be lost. One of the purposes of this document center is to establish a good document structure based on the project management file archive requirements, so that users can upload the required files to a specific directory conveniently according to the specification. In addition, the document center provides spaces and ability for users with different authorization to log in and edit documents such as weekly meeting minutes, status report, review committee comments simultaneously. This work reduces the hassle of sending documents back and forth through email, avoiding potential out-of-synch editing, and improving work efficiency. Furthermore, this platform could record the revision process of the documents. Figure 4 shows the reviews of 1st meeting of International Advisory Committee for HEPS which is in the SharePoint document center.

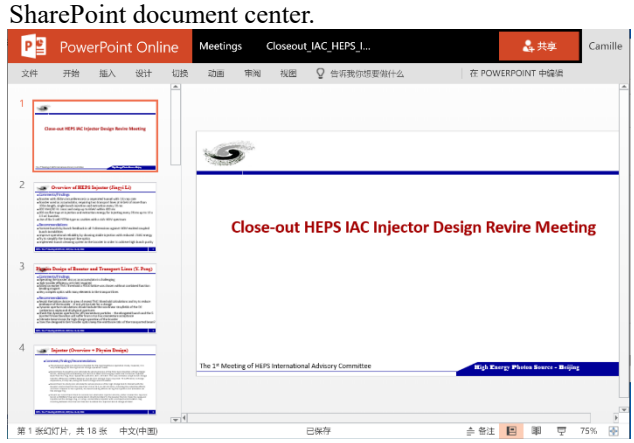

Figure 4: 1st IAC meeting review.

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Forum

The purpose of this site is to provide HEPS members to create technical discussion on issues or achievements with other members in HEPS. The discussion forums are available for authorized members, different members can access different section according to authorization settings. Every member can launch a new discussion in the areas they care about or participate in other topics which launched by other members via this platform. At present, we have five HEPS technical sections named as Accelerator, Beamline, Technical Support, Utility and Civil Construction and one SharePoint Technical which is used to discuss features of this platform.

Searching

The number of HEPS's documents is increasing daily, there are many document formats such as Word, Excel, PowerPoint, PDF, XML, etc. We had deployed search server into the SharePoint platform which provides search function for users shown in Fig. 5. The search architecture contains search components and databases. After configured the crawl content sources and search rules, and put the searching function into use, users are able to find information they need from the SharePoint database or other external data source quickly and easily. Additionally, users with different permissions could get different results when they perform the same search query.

Figure 5: Search user interface.

Project Management

The total investment of HEPS is close to 5 billion RMB (~$700M), and the scheduled completion date is at the end of 2025. In order to complete this large project as scheduled without delay, we use project software to help project managers with Work Breakdown Structure (WBS), developing project schedule, assigning resources to tasks, tracking progress and spending, and so on. Moreover, we had deployed project server which uses our SharePoint platform as its data sharing foundation and provide Project Web App (PWA) user interface which is a browser-based application. The system mangers could use project professional software to plan their projects and save the plans to the project server [figure6], and the upper managers can see all project schedules and plan the upper level projects accordingly. By using these tools, every employees can also manage daily work and collaborate effectively with others.

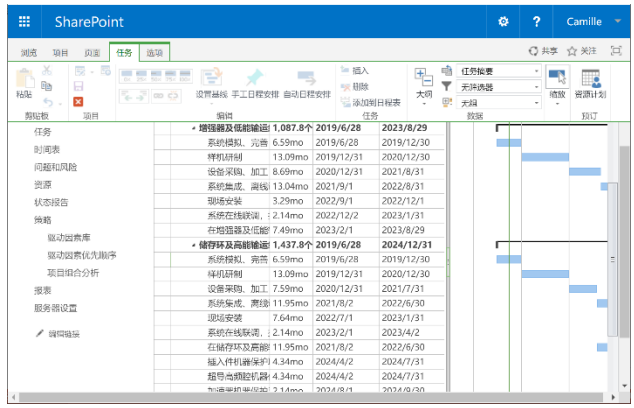

Figure 6: PWA user interface.

Authorization

HEPS project include many different roles which has been added to the different groups that were assigned specific permissions according to project needs. This platform includes several roles groups as the followings:

- Visitors: users who cannot sign in, need to read the news or watch the videos of HEPS, but do not have access to the details organizational information.
- Committee: could signed in and review the system reports, write reviewer comment.
- HEPS members: have access to information on the site after once signed in, can participate in forums, wiki, and edit document, etc.
- Site administrators: manage contents and roles of different divisions.
- Site collection administrators: ultimate control for the site collection, manage the functionality of features such as activate or deactivate site collection, document, recycle, etc.

THE NEXT STEPS

The next steps will be:

- Improve the user interface of HEPS website
- Increase contents of document center and media lists
- Create more discussion forums, show upcoming events.
- Manage the HEPS project systematically by making full use of project server
- Achieve data visualization for HEPS project progress and funding performance for the purpose of data analysis.

CONCLUSION

The initial SharePoint and Project setup for HEPS has completed. Many features have already been delivered and used by users. This paper explains the system design for most of the features of the HEPS Technical Systems and Project Management. The system might not be perfect in terms of look and feel, nevertheless, it is very suitable to start working efficiently. It is hope that more members will adapt to using this platform.

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