

## DEPLOYING AN OPEN SOURCE WEB PORTAL AS A TOOL FOR KNOWLEDGE SHARING AND COLLABORATION

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The sudden increase of information in recent years has given rise to the issue of managing the vast amount of information in a systematic manner. For this purpose, a web-portal provides a suitable means to publish information in an organized manner for easier access and comprehension. It enables the efficient creation, editing and retrieval of data and information. We have developed a web portal system intended to serve as a central source of information and knowledge on technology and business, tailored for the Information and Communications Technology (ICT) industry. This portal aims at being a one-stop centre for ICT professionals to access and share information as well as to collaborate. The portal was developed using open source software (OSS); an existing open source content management system was identified and selected, to which we added custom-built modules. This paper traces the need for creation of an ICT portal, the benefits of using web portals and also the services offered by our ICT Knowledge exchange portal developed through the use of open source software.

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## 1. INTRODUCTION

A web portal is an online tool to aggregate information in one location in an organized manner for dissemination. The 'information explosion' of recent years has given rise to the issue of managing the overwhelming amount of information in a systematic manner. The web-portal is a web site designed to be a 'first port of call' when a user goes online. Web portal services often include search engines, email, maps, forums, chat, shopping, news, and options for customization. Web portals have evolved significantly over the past few years to cover a broad range of capabilities such as web content management, document management, records management, etc. Portal technology allows content to be broken into more granular and reusable components, thus giving structure to unstructured content [Goldman, 2004].

We begin our discussion in section 2.0 by indicating briefly our need for the development of a knowledge exchange web portal. We then, in section 3.0, provide an overview of the concept of this web portal and describe its key goals. In section 4.0, we illustrate the services offered by this portal. We go on to highlight the content and functions of this portal in section 5.0. In section 6.0 the architecture and development of the portal is given. Also certain networking technologies are mentioned such as the use of faded information field architecture with the help of Mobile agents which can enhance the access to the portal. We round up the paper with some concluding remarks in section 7.0.

## 2. NEED FOR A WEB PORTAL ON ICT IN MALAYSIA

Technological development is a key element in Malaysia's plans to achieve industrialized nation status by the year 2020. The Malaysian government's recent drive to make Malaysia the ICT Hub of South-East-Asia through its constant efforts in developing the Multimedia Super Corridor (MSC) has resulted in an upsurge of all ICT related businesses. A concern within the Malaysian ICT industry is that there are no formal or well-defined strategies for coordinating or tracking technological developments across the industry or the country. There is a dearth of information on ICT developments in the country. Albeit, one can find pieces of information here and there if one is diligent enough to look for them but a central repository that alleviates these time consuming efforts is not present at the moment. Malaysian Science and Technology Information Centre (MASTIC) of Ministry of Science, Technology and Innovation (MOSTI) provides some information but this is neither comprehensive nor dedicated to ICT per se [MASTIC, 2004].

The Information and Communication Technologies Knowledge Exchange (ICT K-Exchange) is a vertical portal system, intended to serve as an online central source of information and knowledge on the technology and businesses of ICT - tailored for local ICT industry. The Exchange is intended also to serve as a communication gateway for ICT industry professionals, partners and their customers, government and other interested parties. The ICT K-Exchange portal that we have developed aims at being a one-stop centre for ICT professionals to access and share information as well as to collaborate. Through these means, it is possible by active championing to promote the development of 'communities of practice' in various areas of ICT. These communities of practice would, depending on how well they are nurtured, form the bedrock of expertise to bring the ICT industry to the next higher level. Obviously, the success of the portal will depend very much on its contents and the services it provides.

## 3. CONCEPT OF THE ICT KNOWLEDGE EXCHANGE PORTAL

The key goals of this portal are to function as a platform for exchanging ideas or views on technology and business trends or forecasts and to raise awareness among local ICT research and industry players on local and global ICT development- technology, business, policy etc. It will also help in improving opportunities for research and business networking through knowledge sharing and online interactions among the relevant players (individuals, government, universities, research institutes and industry) to accelerate innovation in the ICT field.

To meet the above goals, the concept of Community, Collaboration and Interactivity was used to guide the design of this portal. The portal is viewed as a place for a group of people with common interest

on ICT to meet and chat virtually. It is thus a source of information and 'knowledge' to be shared among ICT players. The portal through its functions allows visitors to share ideas and information and helps to get to know each other. As a collaboration tool, the portal helps in promoting activities for mutual benefits, through online joint learning or partnership programs (e.g. online project collaboration). It is interoperable allowing opportunities for standardization, thus making it easy to use, flexible and powerful.

Collaborative portals help users organize, find, and share unstructured office content, for example, e-mail, discussion group material, office documents, forms, memos, meeting minutes, web documents, etc. Collaborative portals differ from Internet and intranet portals not only in supporting a wider range of information, but also by providing a set of content management and collaborative services [Sun, 2005]. There are different ways of communicating jointly, and it is important that the interaction can be done quickly and easily, enabling multi-way communication - user(s) to user(s), user(s) to the website system or vice versa (e.g. chatting, queries and conducting survey).

#### 4. SERVICES PROVIDED BY ICT KNOWLEDGE PORTAL

Since this Knowledge exchange portal is intended also to serve as a communication gateway for ICT industry professionals, university researchers, government agencies, suppliers and other interested parties, several features were identified as important:

- an idea management system;
- a proposal submission system;
- a project management system;
- a portfolio management system;
- an IP management system;
- a project completion report submission system;
- a document management system for managing and organizing of documents;
- a directory of websites where links are organized into structured categories;
- search engines for browsing and retrieving information;
- discussion forums for interaction among community members to discuss issues and share information quickly and easily;
- a chat system for real-time interaction amongst community members;
- an email system;
- a news management system to post and comment on news.

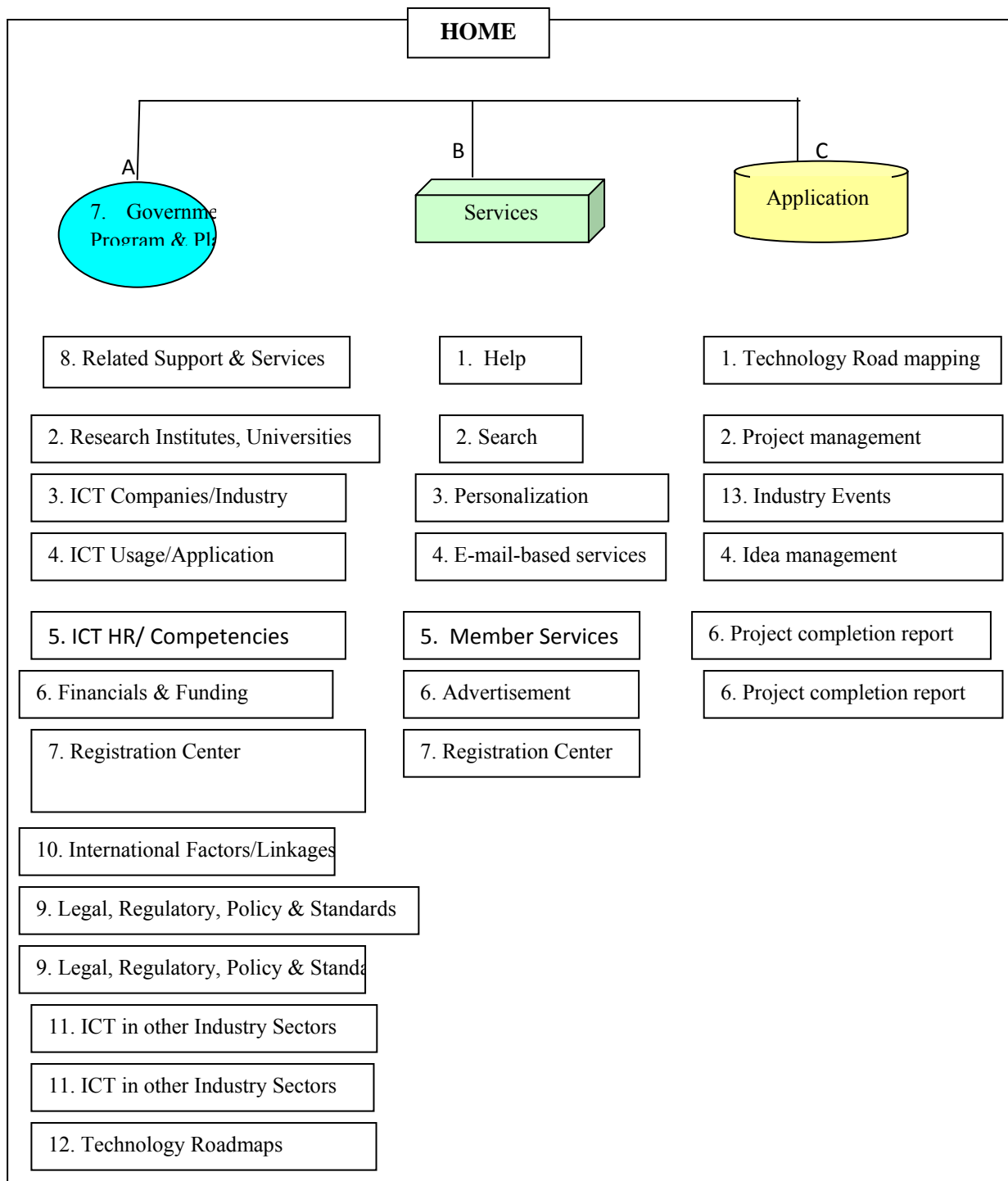
In addition to the above features, other standard features such as calendars, planners, address book, etc were also identified for inclusion. The structure in Figure – 1 shows the portal contents grouped into 3 areas - Information, Services and Application. As an example of a sitemap of the ICT K-Exchange this figure shows the content list to a certain level. The sitemap also illustrates the structure or organization of the portal contents and how they link to each other. All the linkages amongst the branches/contents are not shown.

#### 5. MAIN CONTENT AND FUNCTIONS OF ICT KNOWLEDGE PORTAL

Content includes everything on the site that is delivered through browsers, as well as all the software processes that directly or indirectly support that delivery. Content that reflects perspectives, priorities and concerns are the primary focus of the knowledge exchange portal.

The main contents/functions of the portal are grouped into:

- Information
- Service
- Application



**Figure 1:** Sitemap of ICT Knowledge-Exchange Website

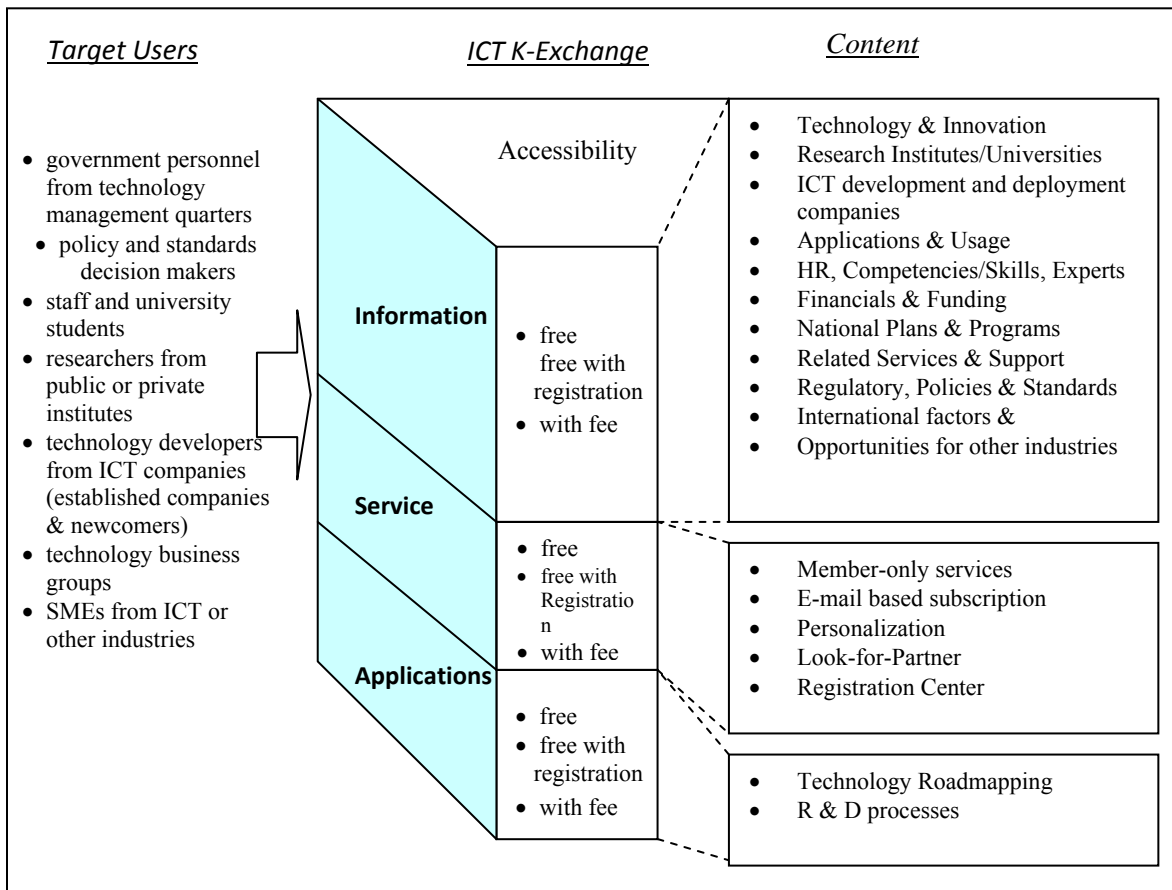
This classification is important because it indirectly spells out:

- The type of approach/operation model needed to populate/maintain them. For example, the information-type content will be of generally 3 types - those needed to be updated daily (e.g.

news), occasionally (e.g. special articles, statistics, case studies), and when necessary (e.g. policy updates, standard procedures and regulations )

- The sources and how to acquire the information, e.g. whether through subscription, through independent search and analysis, or through collaboration/agreement with other parties. Section 4 outlines some of the initial identified strategies.

Figure – 2 shows target users and the planned content of the portal. The content can be viewed/consumed either for free (for all users), registered users (free registration as members), or fee (per subscription or per view).



**Figure 2:** ICT K-Exchange, its contents and target users

In addition to this, the content contains some modules that give the users some sense of belonging to the portal and its communities such as email, forum, chat, search etc. It also allows a certain degree of personalization/customization of portal content as well as features/appearance can be changed by the user. By aggregating diverse applications, services, and content and securely delivering them to users in a personalized way, portals can be of great help in the reduction of cost and time as well. It is also necessary that the content has latest and up-to-date content.

## 6. ARCHITECTURE OF THE PORTAL AND ITS DEVELOPMENT

A client is defined as a requester of services and a server is defined as the provider of services. The client/server software architecture is a versatile, message-based and modular infrastructure that is intended to improve usability, flexibility, interoperability, and scalability as compared to centralized, mainframe, time sharing computing [Sadoski, 1997].

A number of considerations have to be taken before starting the development of a portal. First, using an available existing open source web portal development kit gives a big advantage in terms of saving time. Do not use a portal which does not have support from professionals. Since most applications

have bugs, having a community of developers and users makes it easier to remove bugs. Security is a key concern in developing a portal. The portal should be well protected from attacks from users. A multilevel security level is needed and the portal should be updated regularly with the help of patches produced by the developers. The portal architecture allows users to sign on once and manage access privileges to all individual modules and specific content centrally. An important aspect of portal is that it should be independent of the operating system. This would enable easy migration from one platform to another. Code should run identically whatever the platform is. Further, one must choose wisely the programming language to be used for developing new modules so that they integrate well with the base system. An important feature in the architecture of a portal should be centralized shared services. In addition to this, the access to different users should be having a local control.

The computing power of the machines necessary to create portals exceeds the technical specification of those systems used to distribute it. With the spread of advanced technology that aims to close the digital divide, Faded Information Fields can help in a great deal by providing the information at a rapid pace and also the information will be easily available. Mobile agents can support each of four main monitoring activities performed in an object based system – generation, processing, dissemination and presentation of information [Sloman, 1994]. In addition to this, such kind of network architecture has been able to reduce congestion and also considerably reducing processing time to access web portals. The use of mobile agents provides a potential approach for a portal network for efficient information dissemination and retrieval.

## 7.0 COMMON SOFTWARE TOOLS USED FOR BUILDING THE OPEN SOURCE WEB PORTAL

The software tools that we have used for the development of web portal include:

### 7.1 Web Server

A web server is a software application that uses the Hypertext Transfer Protocol (HTTP) to deliver specific services for a client system or systems. A web server may host or provide access to content and responds to requests received from web browsers. It usually runs on a computer connected to the Internet. There are many types of web server software including public domain ones such as from Apache, and commercial ones from Microsoft, Oracle, Netscape and others. An open source web server is available for free on the Internet from the following website <http://www.apache.org/download>. It is compatible with both UNIX and Windows environment.

### 7.2 Database server

A database server forms the back-end or server component of a client-server system, which can be accessed by one or more clients, or front-end applications through the use of query language, typically MySQL. The server is responsible for updating records, ensuring that multiple accesses is available to authorized users, protecting the data and communicating with other servers holding relevant data. The client-end requests records and then modifies them, while the server tracks records for the client and adds new ones. The MySQL open source database server is available for free at <http://www.mysql.org>. Figure – 3 illustrates a typical client-server configuration.

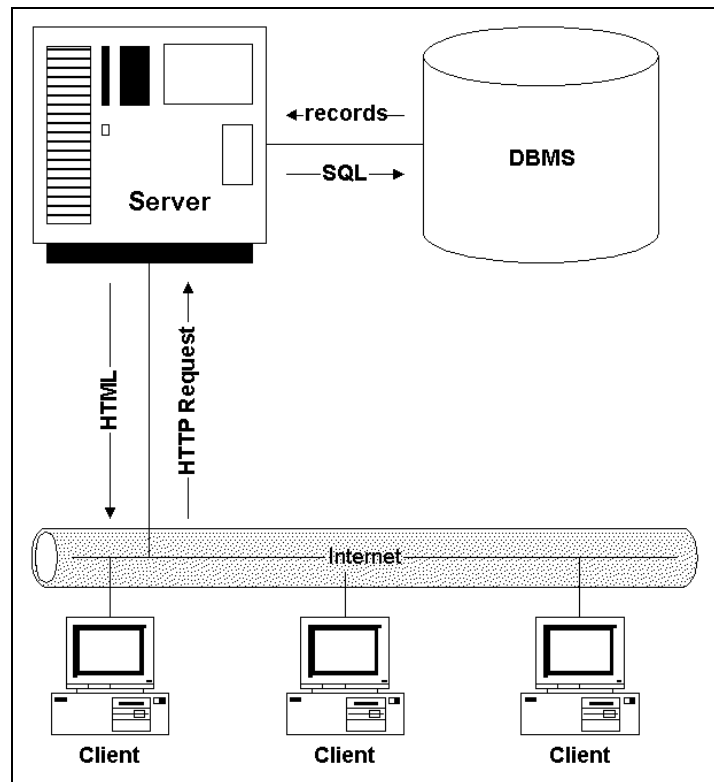


Figure 3: Client-Server Architecture used in web portals [Sah, et. al., 1996]

### 7.3 PHP Hypertext Preprocessor

PHP Hypertext Preprocessor, an open source, server-side, HTML embedded scripting language is used to create dynamic web pages. In HTML document, PHP script (similar syntax to that of Perl or C) is enclosed within special PHP tags. Because PHP is embedded within tags, the author can jump between HTML and PHP (similar to ASP (Active Server Page) and Cold Fusion) instead of having to rely on heavy amounts of code to output HTML. Since PHP is executed on the server, the client cannot view the PHP code. PHP can perform any task that any program can do, but its strength lies in its compatibility with many types of databases. Also, PHP can talk across networks using IMAP, SNMP, NNTP, POP3, or HTTP [10]. PHP can be configured automatically or manually to meet the requirements and it can be downloaded free of cost from <http://www.php.net/downloads.php>.

Figure 4 depicts the main page content of the portal. The main page constitutes of modules and blocks which contains the content and applications respectively. As discussed in section 6, certain networking technologies such as Faded Information Field (FIF) can be incorporated so as to increase the performance and efficiency of portals. FIF is a set of computers around an information provider where the information provider distributes its information contents. Thus, the information of the provider is replicated to surrounding nodes, creating a “field” of information. [Arfaoui & Mori, 2001].

### 8.0 RECOMMENDATIONS

A number of considerations have to be taken before starting the development of a portal. Firstly, a big advantage in terms of saving time is done by using already built software which are commonly available as open source softwares. An open source web portal should be selected on the basis of its popularity as well as support of professionals. Since most applications have bugs, having a community of developers and users makes it easier to remove bugs.

Security is an important concern for developing a portal. The portal should be well protected from attacks from users. A multilevel security level is needed and the portal should be updated regularly with the help of patches produced by the developers. An important aspect of portal is that it should be independent

of the operating system. This would enable easy migration from one platform to another. Code should run identically whatever the platform is.

Further, one must choose wisely the programming language to be used for developing new modules so that they integrate well with the base system.

## 9. CONCLUSION

The ICT K-Exchange is a web portal system which serves as an online central source of information and knowledge on ICT technology and businesses. It is intended to serve as a gateway for communication for ICT industry professionals, partners and their customers, government and other interested parties. This paper covers the development process and the content of the web portal. We have listed and briefly explained the various services offered and we firmly believe that our use of open source software has helped us develop a web portal to not only meet our needs but also develop it at a faster pace.

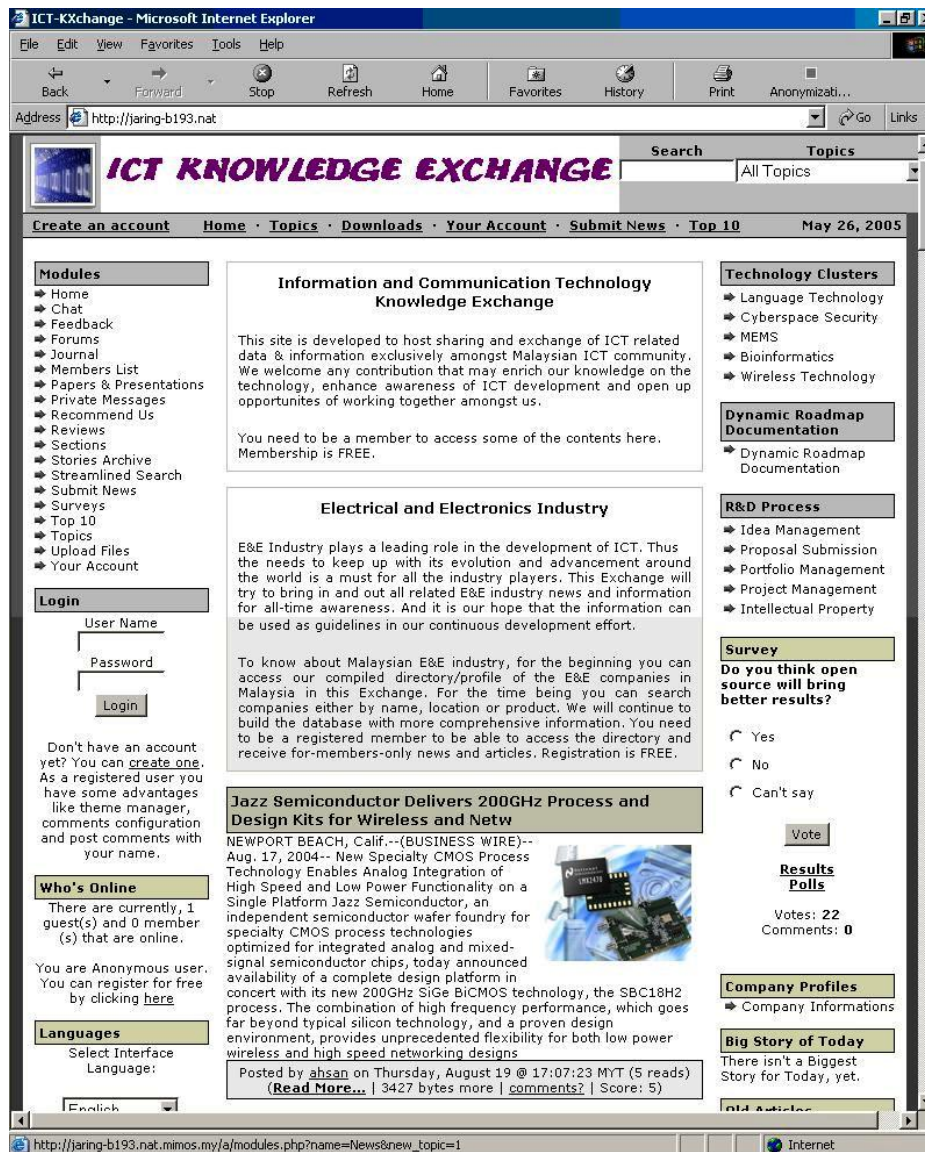


Figure – 4: Screen shot of ICT K-Exchange portal

In this paper, we have shared our experience in developing a web portal using an open source portal development kit. We have listed and briefly explained the various steps we took to develop a web portal in

the hope that this would help as a stepping-stone for future portal developers. We firmly believe that our use of open source software has helped us to quickly develop a portal to meet our needs.

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