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Grid Portal: A Web Based Gateway

Er. Neha Mathur, Er. Mukesh Gupta
[1,](M.Tech Scholar, Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur)Guided
[2,]M.Tech(IIT, Bombay) ReaderDepartment of Computer Science & Engineering Swami Keshvanad Institute of Technology, Management and Gramothan Jaipur

ABSTRACT- *Grids computing "have emerged as a common approach to constructing dynamic, inter-domain, distributed computing and data collaborations. In this environment, as the resources are usually distributed geographically at various levels, there is a great challenge for providing those resources and services of the grid which are of user's context. The purpose of this paper is to use the services of the grid by the grid portal which acts as a front end of the grid and also discussing the need and importance of a portal. A portal is built upon layers of services and component modules. This paper focuses on the architecture of portals. Grid portal provides a unique interface for end-users to access distributed resources and are used widely in Grid. Portals use portlets as pluggable user interface components that provide a presentation layer to information systems. Portlets are Java based Web components, which makes a portal more flexible and can be easily reused. In this chapter, we also briefly consider the different types of portals that exist.*

I. INTRODUCTION

In the Today's living environment, we come across several types of portals, these may be mobile/phones through which information, news and updates would be delivered, stock exchange that facilitates the process of informing the share holders about latest price, news , reports, bids etc. These could also be newspapers and magazines from which user's gets information about world events, sports, stock market, advertisements and local happenings. In organizations company bulletin boards act as a portal as it provides relevant information about the growth and the environment of the company.
In the recent two years, need of portal are increasing greatly as portals provide a single point of access to aggregated information. A Portal is basically is a platform for the user to access every type of information required. It is a container of resources and functionality that can be made available to end users.

II. NEED OF PORTAL

In the present scenario many organizations are being run by the help of the web in order to distribute the information and provide services to their users including employees as well as, customers etc. But, to user who is unaware about the organization, for such type of user it will be very difficult to locate the information and services of his or her interests under there situations, the user will enable to overload the information and services. In order to overcome from this type of problem and also in order to preserve the user from facing such type of situations and also presenting a method to fulfill the various needs of different users, we can aggregate, the numerous types of information and services provided by the different organization all over the world, based on the division of the service providing departments., so that the user can easily access to its required service.

On the basis of Grid:

In the grid computing environment, we have two main types of Grid users, one is system developers, who build the grid systems and the users who use the grid services to solve their specific problems. A Grid portal provides end users with a list of available software and hardware resources specific to their particular problem domain. In the Grid computing, portal is a web based gateway that provides consistent access to different types of backend resources. It also provides a single point of access to grid based resources that they have been authorized to use.

III. FEATURES OF PORTAL

A portal provides the following desirable features:
(1) **Aggregation:** Allow the different types of information and service providers to set up and update their own information and services, according to the specific needs of different users as well as common users groups.
(2) **Personalization:** The above feature thus becomes useful for the users to select the services according to his or her profile at the appropriate time.

(3) **Customization:** Setting up the information and services from the user's context rather than from the perspective and convenience of service provider.
(4) **Organization:** The user can select the information and services that are of his interests and customize them to provide a better sense of information.
(5) **Integration:** The multiple applications and resources and services can be combined, so that user can work on it.
The portal also includes the following essential features:
(1) **Search:** Different kind of information and services mounted on the web through portal it is easy to integrate all these applications and services, so that search becomes easy.
(2) **Content Management:** The information service providers containing various types of information, and presenting them to the user according his profile appropriate. This is including creation, management and delivers of content.
(3) **Single Sign On:** This provide the user an ability to gain access to the different information resources and services that are supported by different application systems provided by different departments**.**

IV. COMPONENT OF PORTAL

Portlet: Portlet are web components that are designed to integrate information of the various pages into a one page. These are called, whenever there is a request for a page in portal. This is because; these produce a fragment of mark up code that is aggregated into a portal.
Portlet Application provides a way to package a group of related portlets that share the same context; here context means all resources, such as images, properties, files and classes. The portal application consists of portal service that sends requests to the portlet applications. In the response, portlet application initialize and aggregate the portlets to generate the dynamic content.
Portlet Container store the various portlets as well as manage the life cycle of portlets by initiating them and destroying them through calling methods such as init page(), perform title(), portlet Service()

V. ARCHITECTURE OF PORTAL

The Architecture of Portals is a continuous developing process which gets modified at every generation. The First Generation of Grid portals mainly used a three-tier architecture:

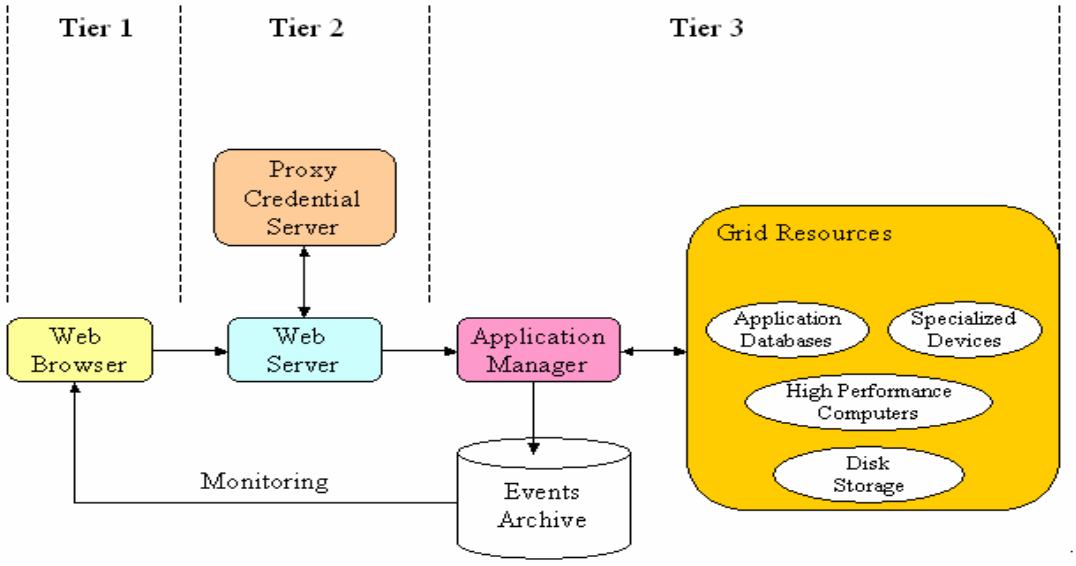

Figure 1.1: First Generation Portal architecture, with its three-tiers

The Three-Tier Architecture is composed of an interface tier i.e. web browser, a middle tier i.e. web server and a third-tier includes backend services and resources. Whenever the client requests, a web server generate a proxy credential (certificate) from a proxy credential server and use it to authenticate the user. Then the user provide a complete description of its task, they wanted to execute, by knowing these. The Application Manager launched by portal web server controls and monitors the actual execution of grid tasks. Once authenticated, a user can request the portal to access grid resources on the user's behalf. A portal also allows the users to upload input datasets required by tasks that are to be executed on the remote resources.

The First generation Portals includes:
(1) Grid Portal 2.0(GP2) is portal based grid portal which facilitates the development of application specific portals. This provides various tools that provide consistent interfaces between the infrastructures i.e. based on grid technologies such as GT2.
(2) HPC Portals uses the CAPI in the Globus Toolkit for MDS, Grid FTP and GRAM.
(3) GPDK is another grid portal toolkit that uses Java Server Pages (JSP) for portal representation and Java Beans to access backend grid resources via GT2.

Grid Portals can be divided into two types one is application-specific portal and another is user-specific portal. From these the application-specific portal provides various grid services and operations within a specific application domain. For Example Astrophysics, Simulation Collaboratory and the Diesel Combustion Collaboratory whereas user portal provides grid services and operations that are site-specific for a particular community and research center. For Example the HotPage user portal, the Gateway project and UNICORE. The GPDK is a Grid portal Tool kit refers as Grid Portal Development Toolkit which is used to develop portal i.e. both application-specific and user-specific portals.

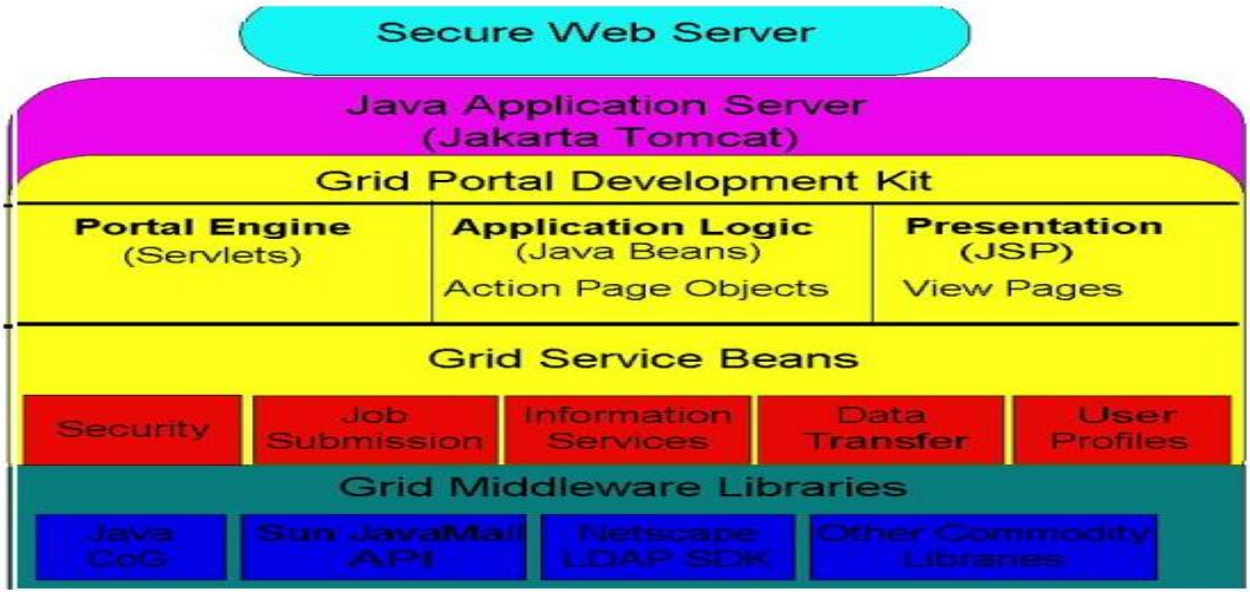

Figure 1.2: GPDK architecture, with the grid service beans and grid middleware libraries shown

This tool kit is based on the three- tier architecture of portal which is the architecture of first generation portal. In this architecture the Client tier is represented as a web browser consists of user's workstation supporting DHTML/JavaScript to make the screen interactive and use cookies which supports transformation of data between client and server. When the end users requests for a portal page to open, this request is handled by the second-tier i.e. Web-application server. In order to respond to more than one request the server should be multithreaded and should support multiple and simultaneous connections to web browsers. To make grid resources easily accessible by the end users the GPDK enhances the capabilities of the Application server with grid enabling software. The third-tier of the GPDK is the Back-end resources that includes databases storing user profiles, online credential repositories or additional resources. The Back-end resources are under the control of an administrator from the web-application server which different polices and use conditions for the users.

The GPDK is composed of three core component that are Portal Engine (PE), Application Logic and presentation. These core components use the grid service beans in order to provide some grid technologies including security, data transfer, access to information services, and resource management. The Grid service beans are reusable Java components that use lower-level Grid enabling middleware libraries to access Grid services. The portal Engine generates a portal and provides control of this portal in the form of Java servlets. The Java servlet that forwards control to the Action Page Objects (APOs) and the View Pages (VPs). The APOs is then used to generates a model and provide encapsulated objects used to perform various portal operations. After APOs, VPs are then executes which provides a user and application specific display to the above generated portal which is then transmitted to the client browser

5.1. Limitation of First Generation Portals:

Lack of Customization: here instead of portal users, portal developers build the portals. This is because portal developers have much information needed to use the portal toolkits. Thus, the end users cannot customize the portal according to their needs.

Restricted Grid Services: The Portals of first generation provides limited portal services as these portals are tightly coupled with grid middleware technologies.

Static Grid Services: The first generation Portals does not provide newly created services to users thus these are not suited to the dynamic grid environment in which more and more services are being developed.

5.2. Second Generation Portal

In order to overcome the limitation of first generation portals, second generation grid portals are being developed. This generation grid portals introduce portlets. From the User perspective, a portlet is a window in a portal that provides a specific service e.g. a calendar or news feed. According to an application developer, a portlet is a software component which is managed by a portlet container.

Portlet is java based technology based web component that processes the user requests and generates dynamic content. This dynamic content is called as a fragment. The fragment is a chunk of mark up language (e.g. HTML, XHTML, WML etc) following certain rules and can be aggregated with other fragments to build up a complete document. The content of a Portlet is normally aggregated with the content of other portlets to form the portal page. A portlet container run time environment, in which portlets are initiated, executed and timely destroys.

The Portlets are logically associated into a group by a portal application. Portlets are the individual classes that are contained into the portal application and it associates them into a group. The portlet applications are standard J2EE web application which deploys a portlet. When the Portlet application receives the portlet requests from the portlet container, they easily get the details about the client requests and can access information about the state of portlet and can also get query details about its configuration from the portlet requests objects.

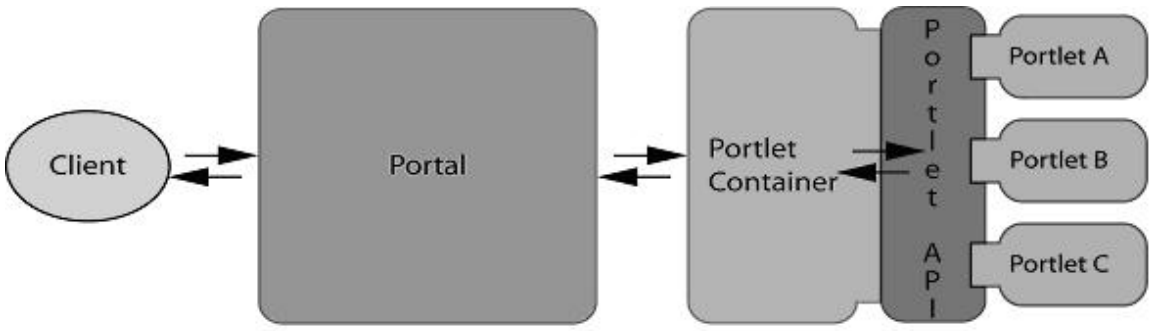

Figure 1.3: Portal architecture, with the portal aggregating the content and the portlet container running the portlets

When a client gets registered and thereafter when opens a portal, the request is send to the specific portal. After receiving the client's requests the portal application retrieves the data of user's context from the portal database which gets reflected in the requested web page. The portal application then contacts the portlet container for initializing all portlets on the requested page. The portlet container through the Portlet Application interface (API) then calls the portlet needed. The portlets then gets initiates and each portlet generates a markup fragment. These generated fragments are then returned to the portal . The portal aggregates all markup fragments together into one page. This page is then returned to the client with useful interface.

VI. TYPES OF PORTALS

The idea of portal is to collect information from different sources and create a single point of access to information which was initially provided by the Search Engines which provide full content of document as well as various hyperlinks with it. In the context of World Wide Web, the classic search engines is well trained portal that who knows where to search and find the information and services of user's context.

Most of the time we will refer to portal as a place with enterprise information, it is importance to know what type of portal the user want to build.

Thus we can differentiate the various portals on the basis of their content and intended users.

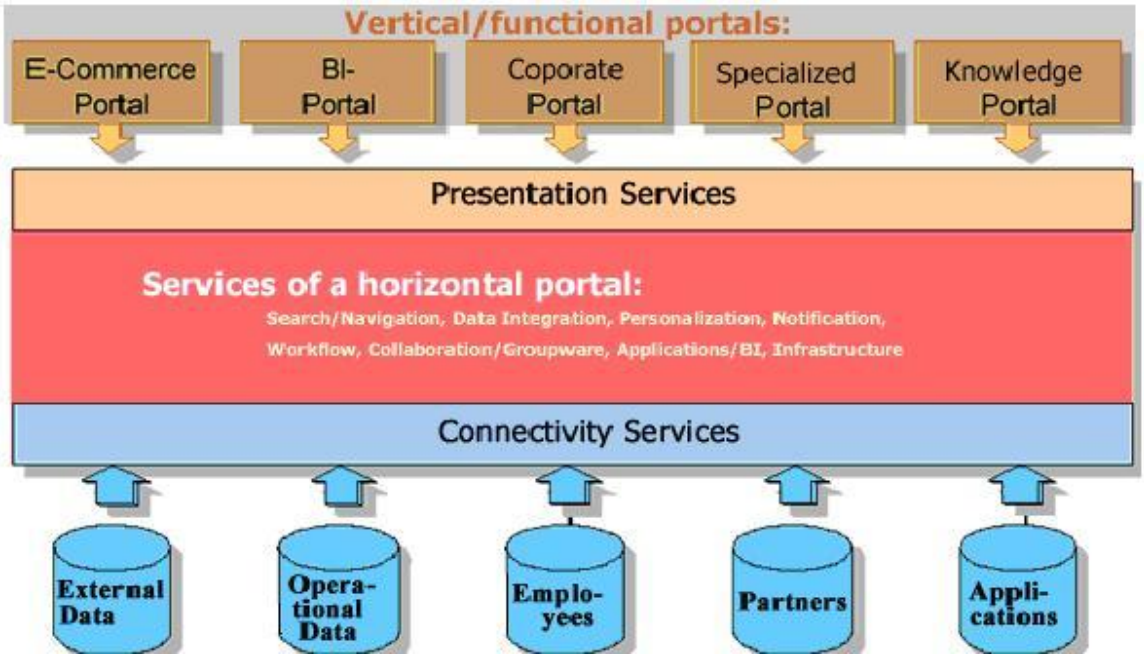

Figure 1.4: Portal types

6.1. VERTICAL PORTALS

The vertical portals are specifically designed for the industry as they provide tools, information, articles, research and statistics on the specific industry or vertical. The vertical portals cannot be established independently, they need support of services provided by the horizontal portal.
The vertical portals are further divided into the following portals:

6.1.1 Corporate Portals

These types of portals are created within a particular group of employees of an organization as well as business partners to provide personalized access to the selected information of their organization which they are running or working in it for example, e-mail, discussion group material, office documents, forms, memos, meeting minutes and other web documents. In the field of internet the corporate portals plays a important role, existing not only for the benefit of the company's own employees but also company's business partners including suppliers, customers and third party as well. These portal provide access to all of the information business applications and services needed by the employees to perform their jobs.

6.1.2. Business-Intelligence Portals

These portals are also know as decision portals as they help user in decision-making process by allowing the users to query and report across multiple data stores for example, general employees of an organization requiring ad-hoc reports related to company performance and then analyzing the results obtained.

6.1.3. E-commerce Portals

Also known as e-business portals facilitate the sharing of information to external partners, customer and suppliers. The e-commerce portals contain a transactional processing component which provides information of products and services which include information for the transportation and storage of raw materials and finished goods.

6.1.4. Specialized Portals

These portals provide valuable information to the workers which increase their effectiveness of knowledge. They achieve their aim by providing easy access to information i.e. necessary and helpful in one or more specific tasks. The set of problem-solving interactions in an enterprise constitutes a continuous, dynamic "swirl" from which knowledge is produced and integrated with the business processes of the enterprise. Knowledge gathering is performed by individuals who belong to communities of interest, where knowledge is shared and accumulated. Communities of interest may be scientific, academic, business-oriented, or government-based. Knowledge Portals are used by the Knowledge workers who gather information relevant to a

task, organize it, search it, and analyze it, synthesize solutions with respect to specific task goals, and then share and distribute what has been learned with other.

6.1.5. Communication Portals

A communication portal is a service that allows individuals, businesses, schools and government agencies to share information from diverse sources using unified communications (UC) media. Bringing together e-mail, voice, mobile, web feeds, testing and conventional telephone services allows access and control from multiple interfaces and locations at any time.

6.1.6. Enterprise Portals

The entry point for the users in this portal is through intranet or the enterprise network. This portal focus on providing information and services to the customers, employees and suppliers of the firm. The enterprise portal also provide services such as search engine, e-mail, customized and up-to-date content as well as provide availability of applications on demand, online training courses and web casts etc. Since these portals are accessed through intranet so it is controlled through passwords and thus its data is protected.

6.1.7. E-learning Portals

The focus of e-learning and training is now on continuous learning and development programs rather than giving new employees an orientation program. Through e-learning portals, effective educational and training courses can be brought to the PCs of employees who can benefit from it in terms of receiving up to date information, customized, accessible 24/7, flexible, convenient, user-centric and in the form of centralized knowledge management. An organization sets up a virtual environment for disseminating access to knowledge to its staff. This is how an e-learning portal is born. The e-learning portals focus on guiding and teaching the learners in the broadcast sense through structured learning experience. Such portals are known differently—e-learning centers, internal portals, online education centers, virtual universities and corporate universities. The e-learning portal, therefore, becomes an access point from where courses, training, applications, services are sent out to customers, employees, partners or suppliers.

6.1.8. Enterprise Information Portals

This is the most complex portal .These are the applications through which the companies can unlock internally and externally stored information. It offers business users an effective way to view and publish information in a personal or group area to share with colleagues internally as well as externally with customers, suppliers, and partners.

6.1.9. Knowledge Portals

These portals provide valuable information to the workers which increase their effectiveness of knowledge. They achieve their aim by providing easy access to information i.e. necessary and helpful in one or more specific tasks. The set of problem-solving interactions in an enterprise constitutes a continuous, dynamic "swirl" from which knowledge is produced and integrated with the business processes of the enterprise. Knowledge gathering is performed by individuals who belong to communities of interest, where knowledge is shared and accumulated. Communities of interest may be scientific, academic, business-oriented, or government-based. Knowledge Portals are used by the Knowledge workers who gather information relevant to a task, organize it, search it, and analyze it, synthesize solutions with respect to specific task goals, and then share and distribute what has been learned with other.

6.2. HORIZONTAL PORTALS

These portals are does not provide the information to a particular group of specific interest rather they focus on wide area of interests and topics. The horizontal portals focus on general audience. Horizontal portals for example yahoo.com, msn .com etc are also called as consumer portals, web portals or public portals. Horizontal portals act as an entry point of a web surfer into the internet, providing content on the topic of interest and guiding towards the right direction to fetch more related resources and information.

VII. PORTAL SERVER

For the implementation of above all mentioned portals the main role is played by the portal container and then the portal server. Portal server is responsible for handling multiple and simultaneous HTTPS client's requests. In today's environment, the widely used portal server is the Sun Java Enterprise Portal server which is the component of the Sun Java Enterprise System. Sun Java Enterprise system is a software system that fulfills the various needs related to enterprise computing such as providing easily access to e-mails and in-home business applications to the employees of an company through a secure intranet portal.

The Portal Server runs in two modes: one is open mode and another is secure mode. In the open mode, Portal Server is installed without Secure Remote access facilities, thus the portal in this mode is a public portal such as my.yahoo, runs using HTTP protocol with no secure access facility. In the Secure mode, the portal server is installed with the capabilities of secure access. Here there exists a gateway which provides single secure access point to all the intranet URLs and applications. In this all services as well as the IP addresses are hidden only the IP address of the Gateway is published to a Domain Name service (DNS) i.e. running on the internet. The only difference between an open mode portal and secure mode portal is that the services presented by the secure portal typically reside in the demilitarized zone (DMZ). In computer networks, a DMZ (demilitarized zone) is a computer host or small network inserted as a "neutral zone" between a company's private network (intranet) and the outside public network (internet). It prevents outside users from getting direct access to a server that has company data. In a typical DMZ configuration for a small company, a separate computer (or host in network terms) receives requests from users within the private network for access to Web sites or other companies accessible on the public network. The DMZ host then initiates sessions for these requests on the public network. However, the DMZ host is not able to initiate a session back into the private network. It can only forward packets that have already been requested.

VIII. CONCLUSION

In this paper we discover the details of portals and portlets. First, we explained what is portal and why it is required. Then showed its different applications. At end we came to know that a portal is the single point access to a wide variety of content, data and services. Next we showed the role of portlets in generating a portal page. As we also covered the components and their role played while that initializing and aggregating the portlets related to a particular portal page. Finally we present a framework for the design and implementation of future portal we can generate a several different users according to users need.

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