July 18, 1997

3-Tier Architecture For Enterprise wide IT Solutions

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3 – TIER ARCHETECTURE FOR ENTERPRISE WIDE IT SOLUTIONS

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ABSTRACT

The concept of adapting 3 – Tier Architecture for enterprise wide IT is being discussed for quite some time now. With the advent of internet technologies, more and more IT leaders are promoting 3-Tier Architecture and software houses are developing tools required to implement IT solutions for enterprise. The R&D team COMPUTER GROUP is working on adapting the same for its internal needs to explore the intricacies of implementing Enterprise wide IT solution. The enterprise wide computing has its roots in centralized computing which provides centralized management of resources. The WEB technology has universal interface and capability to mix conventional data and unstructured data with multimedia features. Now industry is forward to have the centralized control, user friendliness of GUI universal access, hypermedia flexibility and Rdbms reliability in their IT solutions. The 3-Tier Architecture will enable the enterprise to have the advantages of all prevailing innovations along with conventional wisdom. The first tier is the conventional DATA warehouse making use of clustered multi processor systems configured with high availability features. The second tier is the WEB server which will act as application server and all the application executables will be maintained on this level. The third tier is user interface through NC i.e. any Java enabled browser. The second tier plays the crucial role of interfacing the NC with the DATA warehouse. The CGI, java script and JAVA provides the basic interface between NC and WEB server for data communication. The JDBC can provide the interface to Rdbms server. However, to build a comprehensive application to suite enterprise needs, we need some tools at web server inaddition to available tools. The SCO Corporation is working on Tarantella server to fill the gap. The WEBLOGIC is working on T3 Server on similar concepts. Making use of these technologies, enterprise wide IT Applications can be built on 3 – Tier Architecture.

1. Introduction

The concept of adapting 3 – Tier Architecture for enterprise wide IT is being discussed for quite some time. With the advent of INTERNET Technologies, more and more IT leaders are promoting 3 – Tier Architecture and software houses are developing tools required to implement the IT solutions for the enterprise. Computer Group is working on adapting the same for BSD information systems. This paper while sharing our experience with the audience, discusses the need for 3 – Tier Architecture (Section2), the architecture details (Section3) and the technologies (Section4), case study of implementations of BSD Information Systems is presented in Section5, and conclusion is covered in Section 6.

2. The Need

The enterprise wide computing has its roots in centralized computing which provides centralised administration, maintenance and control. The Microsoft revolution has lead to the concept of distributed processing and Client – Server paradigm has emerged providing user friendly GUI based access facility to end user. Mean while, INTERNET has connected the entire world, and platform independent access to hypermedia applications has become reality. Now, the enterprise is looking forward to adapt INTERNET Technologies for their enterprise needs on their INTRANET. Also, they would still like to have centralise control, GUI based user friendliness and would like to mix hypermedia information on the server along with their database, without reengineering the existing applications. The 3 – Tier Architecture is expected to provide the advantages of all the three technologies to the enterprises.

2.1 Objectives

The Objectives of 3 – Tier Architecture can be defined as given below:
Centralised Management of data ware house applications, Platform independent access, Mobile Computing Access to existing applications without reengineering and retraining.
GUI based universal interface, Interfacing multimedia data with conventional data bases, Highly scalable environment and Easy migration of applications.

3. Architecture

The 3 – Tier architecture will have 3 types of components viz., the front end, the web server and data server

The front end Man/Machine (MMI) interface will be provided by NC (Network Computer) to provide access to the applications from any where, any time. The NC can be any machine i.e. desktop or palmtops or phones which has JAVA enabled browser and connected on the network

The second level is the Web Server which acts as an application server and repository of hypermedia data to the front end NC.

The third level is the conventional (RDBMS) data server which is the structured data warehouse. The web server acts as an interface between NC and data. Web server acts as a client to data server and the data will be served to NC along with hypermedia (HTML document) data. Ideally, user will have universal interface to all the applications and administrators will have centralized control and relieved of day to day maintenance of desktops. The data resides on data server, the application resides on web server and user interface is through NC in a 3 – Tier architecture. The schematic architecture of 3 – Tier architecture is given in figure 1.

4. Technologies

The technology requirements at the three level of architecture are different. Let us examine the requirements at these levels and the matching technologies available in the market today

4.1 Data warehouse

The data warehouse requirements are well discussed and established over a period. The requirements can be summarized as given below.

High processing power, large storage requirements, High availability, Reliability ,Recovery facilities, data consistency Scalability and Data mining tools.

The contemporary technologies available to fulfill the above requirements are listed below:

MPP or NUMA Systems. (SP2 class of machines) High availability clustered multiprocessing RAID & SSA architecture high volume disk drives Relational databases with parallel server. Transaction processors. SMP operating systems with support for.

- Application level parallelism (threads option)
- Network centric computing
- Visual operating environment
- Object oriented programming

4.2 Man/Machine interface

The front end Man/Machine interface is crucial for_ 3 – Tier architecture_. The INTERNET has taken world by storm due to web technology. This easy flexible interface has attracted students, cine-actors, business men and executives to surf the net. The same interface is ideal for implementing applications also. The HTTP protocol of web technology, enables access to data, text, audio and video seamlessly. It provides for action points in the HTML text to enable processing at both client and server ends. Hence, the front end is any JAVA enabled browser and typical examples are given below:

Network computers with Netscape Navigator(NC) Java station with HOT JAVA Windows 95 desktop with INTERNET EXPLORER Novel client with browser Phones, PDA_s Macintosh clients

4.3 Webserver

The technology on Webserver plays a crucial role in interfacing front end with datawarehouse. The action points of interface between web browser and web server is provided through several methods which make the web pages interactive. The CGI, Java Script, Lotus Script, JAVA and Active X are some examples.

The CGI and Java script are embedded in the HTML document and are executed on the web server. The Webserver will capture data from browser, process it and create HTML document which can be sent to browsers. CGI provides easy interface and development environment. However, it has some inherent disadvantages like under utilization of NC power of processing overloading the server, webserver OS dependency and complex development skills Java is the language for INTERNET applications with its object orientation, simplicity, ease of development, platform independence, built in network features and security. The applet, a small program downloadable from web server and executable on browser provides distributed processing and centralized control on applications. JAVA enables development of powerful applications on this environment. The JDBC connectivity classes provide for ODBC compatible RDBMS servers access. However, the built in security features of JAVA are posing some problems. The Java applets can not utilize any local resources of the browser (NC) and can only communicate with web server from which it is downloaded. Hence, the JAVA applets have to talk to a process on web server which can in turn talk to data base server to get the required data. This process can be an application server to get the required data. This process can be an application developed in JAVA as per the specific requirements. Many software houses are working in this area to develop appropriate software to provide generalized access mechanisms. SCO is developing tarantella server and prototype is already demonstrated in SCO-Developers conference in India. Web logic is developing T3 server and beta version is available for downloading on INTERNET. Lotus Corporation has announced its DOMINO Server with some of the features required IBM announced latest version of OS400 with netserver which will provide browser interface to its native applications without redevelopment

4.3.1. T3 Server

The concepts and features provided by Web Logic T3 Server are discussed below:

T3server architecture facilitates the new paradigm client/network computing (in contrast with host centric and client/server computing.) This architecture promotes a thin client (just equipped with browser) to exploit the resources available any where over the network and thus treating the whole net work as its host (...or bigbrother). This facilitates the thin client to raise itself to dynamic demands of the user like:

- Distributed processing
- Resource sharing
- Specific application processing like equity processing
- Event capturing and alerting
- Any other types of resources and facilities available over the net work any where, provided those resource centers support/subscribe to the T3server Framework.

However these thin clients (being thin) do look at/access all above facilities through the T3server to which they establish connection. Also they need not be limited by the resources/ capabilities of the particular T3server as it is also possible to hook to any T3server on the network form then on. WEBLOGIC promotes a concept of “Server farms” in this context (WEBLOGIC documentation).

4.3.1.1. Framework

The T3server Framework provides basically for the following terms of entities/ objects/ facilities

- T3servers
- T3clients
- T3workspaces
- T3servlets
- T3server services and facilities
- Application avenues

A brief understanding of the same should give us an insight about haw the T3server enables client/network computing: T3server acts as the server for the T3clients to be hooked through a connection. The connection between T3clients and T3server is based on TCP/IP sockets but the protocol over these established connections is on ‘RICH sockets’ facilitating for the specific requirements of this context. The T3server to be accessible t the applets built into the HTML documents served by the same webserver. And there by making the applets access the network resources from the thin ‘browsing’ client.

The T3server can also be installed to listen on standard HTTP port 80, in which case it can proxy the HTML requests onto another webserver, and take all the client/connection requests to itself of processing.

A T3 server can be a server or a T3client to another T3server. It is in this context that there can be a flexible interaction of installed T3servers over the network providing different applications and contexts. The T3server farms come into shape facilitating thin client access.

4.3.1.2. Server services

The facilities and services that can be built into the T3server are limited only by one's imagination. However, the T3server comes with the basic built in services like event registration and servicing, server wide logging, administration and configuration etc. The T3server itself, provides many services one of which is logging messages, automatic or on request form clients.

4.3.1.3. Application avenues

WEBLOGIC supplies JDBCT3, EventT3, and RemoteT3 as part of T3server frame work.

JDBCT3 Provides for database access for the clients. One powerful advantage is that the client need not have any local ODBC drivers or libraries. This facilitates database access from applets over the network

EVENTT3 provides for event registration, wherein a specific event and the event handler for that event can be registered on the T3server. From then on the relevant machines can 'submit' the occurrence of an event and the event's action is triggered by the T3server. This facilitates applications like stock price monitoring etc.

Remote T3 provides for creation of processing entities (JAVA classes) to be invoked by the clients for distributed processing application contexts etc.

The JDBCT3 EVENTT3, and Remote T3 are some of the many possible features within this T3server frame work. It is possible for the users to develop, persistent user sessions over different connection events, terminal emulation and connective to access and exploit legacy systems and applications etc.

4.3.2. Tarantella Server

The objective and features offered by SCO Tarantella Server are discussed below:

The Tarantella Technology allows existing Business critical applications on UNIX servers and Mainframe-class systems to be deployed to any Java clients – NCs, ultra-thin clients and Java virtual machines running on Windows PCs, UINX workstations and Macintoshes. Tarantella lets any Java-compatible browser access graphical X applications, character-based applications and SQL-data on UNIX databases across the INTERNET and INTRANET.

There are three major components in Tarantella – application emulation, Web desktop and a configuration datastore

4.3.2.1 Application emulation

Application emulation provides Java clients with access to graphical X applications and character-based applications. The emulators have resume capabilities letting users operate effectively with in the classic browser model. Users can also disconnect from the network and reconnect without loss of information or without having the shutdown and then start-up applications. The emulators run on the server, dynamically downloading lightweight Java applets on a _need to use_basis. Information is sent down to the Java client at optimal performance using the_Advanced Adaptive

Protocol which can adapt to the connection media characteristics and deliver performance optimized to the application type and device.

4.3.2.2. Web desktop

The Web desktop component lets the system administrator customise user's home page so that frequently used applications and data are presented in an iconic form or embedded into dynamic HTML pages.

4.3.2.3. Configuration datastore

The configuration datastore provides a centralized repository for persistent and temporary information that enables ordered management and control of client systems. The datastore can be integrated with external directory information and can also be exploited from within other Web desktops to provide a universal framework for application access

5. Case Study

In line with the Information Technology Leaders, Computer Groups R&D team is exploring the intricacies of adapting web technology on 3- Tier architecture for commercial applications Details of a case study on BSD Information System is presented here. The objective of this case study is to provide comprehensive information for the post sale activities of BSD. It is proposed to provide central information repository and access to all people concerned, at their desk using a web browser on CMGNET. The information repository will have both structured and unstructured data. The unstructured data contains textual data provided by various sections in organized way. The structured data can be accessed through predefined query mechanism. The textual data will be linked to the structured data to enable structured query.

The work order is the key to the BSD Information System and will have data about customer, sector, type of systems, value due date, payments etc. In addition orders will have provision for textual data for technical specifications, commercial detail, procurement status, short supplies and payment terms etc. The scanned copy of the purchase order will be attached to work order of ready reference. The query is on work order number. The same information is accessible through sector wise or customer wise, there by providing easy access to all concerned officers. The access will be provided on the intranet of ECIL which will be connected to INTERNET through DAE net so that universal access is feasible

6. Conclusion

The three tier architecture is evolving in the information technology industry and all future businesses have to develop and sell their products and projects incorporating this technology. ECIL is no exception. Releasing this Computer Group has evolved strategies for the future.

3 – TIER ARCHITECTURE
FIGURE - 1